

INCREASING CHILD COMPLIANCE WITH ESSENTIAL HEALTHCARE ROUTINES:  
ACQUISITION, MAINTENANCE, AND GENERALIZATION

BY

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Submitted to the graduate degree program in Applied Behavioral Science and the Graduate  
Faculty of the University of Kansas in partial fulfillment of the  
requirements for the degree of Master of Arts.

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## **Abstract**

Child noncompliance with essential healthcare routines is a widely reported problem, especially for children with intellectual and developmental disabilities (IDD) (Allen, Stanley, & McPherson, 1990). Noncompliance with essential healthcare routines has the potential to be a serious problem particularly with a given routine that involves the use of sharp objects (e.g., scissors, dental scraper) that may cause harm to a child who refuses to comply with, or exhibits avoidant behaviors during, the procedure. Study 1 assessed the number of children who exhibit noncompliance with essential healthcare routines in a local early education program serving children, both of typical development and those with (or at risk for) intellectual and developmental disabilities, ranging in age from one to seven years. Study 2 evaluated the effects of a reinforcement-based treatment procedure, without extinction, on the acquisition, maintenance, and generalization of compliance with two essential healthcare routines identified as problematic by Study 1. To date, seven young children diagnosed with autism have participated in Study 2. Each child received compliance training within a simulated context of either a haircut appointment or a dental examination, or both. Probes in the simulated setting were conducted periodically to evaluate potential maintenance of compliance in the absence of treatment, as well as generalization of performance to novel therapists. Child compliance was also assessed during haircuts and dental examinations conducted by healthcare professionals in the actual relevant environments to determine the extent to which trained performance generalized. Results showed that mere exposure to the simulated environment increased compliance for two children. Treatment was necessary to increase compliance for five children. Successful generalization of compliance in the actual healthcare environments was observed for only two children. However, dramatic decreases in the occurrence of negative vocalizations and

the use of physical restraint in the actual setting were observed across all subjects. The results extend the literature by assessing the extent to which treatment for compliance with healthcare routines that does not involve escape extinction can be effective and by assessing whether the effects of compliance training in an analogue setting will generalize to the actual healthcare setting.

*Keywords:* demand fading, differential reinforcement, essential healthcare routines, compliance, problem behavior, negative vocalizations, generalization, maintenance

## **Acknowledgements**

First and foremost, I would like to thank Dr. Pamela Neidert without whom I would not be receiving my master's degree. Thank you for your assistance and guidance with this project (and others)! Thank you for giving me the opportunities I need to further my future.

I would also like to thank my committee members, Dr. Claudia Dozier and Dr. Florence DiGennaro Reed, for their insightful suggestions regarding this document and the future of this project.

I would also like to thank my lab mates Brian Greer, Megan Hafen, Makenzie W. Bales, Danielle Gureghian, and Kimberley Zonneveld for getting me started on the path to a Ph.D. Your constant guidance and advice (even now that you have graduated!) has helped me navigate graduate school on a daily basis. I would like to give a special thanks to Kimberley Zonneveld, who started this project and allowed me to take a leadership role.

I must also thank all of the undergraduates that helped collect endless data throughout this project! For the hundreds of times you set up and broke down a hair salon and a dental office, I thank you!

A special thanks also goes to my lab mate Courtney Moore for her help running participants in this project and also for her constant willingness to discuss everything from data, to family, to toddlers, to boys, to dogs, and much more!

Thank you also to Jessica Foster for being a constant friend since interview weekend! Thank you also for your constant advice and willingness to split a cheese dip and eat Mexican (even if we just had it last night)!

Thank you to Joe Dracobly for your constant advice on everything from writing, to research, to clinical cases and, of course, for all of your technology support (even though you insist on Apple products)!

I also must give a very big thank you to Mitchell Daniels for always putting up with all of my craziness! I appreciate your daily support, your mac n' cheese, and your ability to always make me laugh, more than you know.

Finally, I must thank my family without whom I could not be where I am today. Mom and Dad, thank you so much for supporting my dreams and raising me to believe I can accomplish anything. Mary Kate, thank you for all the late night talks and inside jokes to keep things in perspective! Grandma, Grandpa, Aunt Cathy, Anna, Kayla, and Laura, thank you all for supporting me through this graduate school process (and not being too mad that I moved all the way to Kansas)!

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## Increasing Child Compliance with Essential Healthcare Routines:

### Acquisition, Maintenance, and Generalization

Child noncompliance with essential healthcare routines is a widely reported problem, especially for children with intellectual and developmental disabilities (IDD) (Allen, Stanley, & McPherson, 1990). In the practice of pediatric medicine, there has been an increased focus on preventive healthcare (i.e., the effects of behavior, life style, and environment on the health and development of children) demonstrated, in part, by a steady increase in research devoted to the assessment and treatment of child health behavior (Allen, Barone, & Kuhn, 1993). Numerous researchers have reported child noncompliance during *dental examinations* (e.g., Allen, Loiben, Allen, & Stanley, 1992; Allen & Stokes, 1987; Altabet, 2002; Carr, Wilson, Nimer, & Thornton, 1998; Conyers et al., 2004; Davila, 1990; Graudins, Rehfeldt, DeMattei, Baker, & Scaglia, 2012; Iwata & Becksfort, 1981; Kemp, 2005; Kohlenberg, Greenberg, Reymore, & Hass, 1972; Kuhn & Allen, 1994; Ridley-Johnson & Melamed, 1986). In fact, nearly one in four children (22%) seen by pediatric dentists may present behaviors that cause pronounced management problems (Allen, Stanley, & McPherson, 1990). Kemp (2005) suggested that these behavior problems may occur either because healthcare environments are strange and unfamiliar (especially to a young child) or because stimuli associated with going to a healthcare provider are often associated with inherently intrusive, aversive, and painful treatments (e.g., exams, injections, and extractions). Child noncompliance has also been reported to occur with *vision examinations* (Newsom & Simon, 1977; Simer & Cuvo, 2009), *medical examinations* (Cuvo, Reagan, Ackerlund, Huckfeldt, & Kelly, 2010; Gillis, Natof, Lockshin, & Romanczyk, 2009; Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990; Riverie, Becquet, Peltret, Facon, & Darcheville, 2011; Slifer, Tucker, & Dahlquist, 2002), *pill swallowing* (Ghuman, Cataldo, Beck, & Slifer, 2004);



*routine respiratory treatment for cystic fibrosis* (Hagopian & Thompson, 1999); *self-catheterization for neurogenic bladder* (Neef, Parrish, Hannigan, Page, & Iwata, 1989); *wearing prescription eyeglasses* (Deleon et al., 2008) and *prostheses* (Richling et al., 2011); and *routine blood drawings to monitor diabetics' glucose levels* (Shabani & Fisher, 2006). Similarly, children have been reported to be noncompliant with activities of daily living for good hygiene such as *toothbrushing* (Bishop et al., 2013); *dental flossing* (Dahlquist, et al., 1986); *getting a haircut* (Schumacher & Rapp, 2011); and *toileting, bathing, and dressing* (e.g., Piazza, Contrucci, Hanley, & Fisher, 1997).

The exact prevalence of child noncompliance with essential healthcare routines is unclear. Gurney, McPheeters, and Davis (2006) conducted a national survey of children's health to assess the prevalence of health conditions and healthcare use between children with and without autism. They found that children with autism had a greater prevalence of depression or anxiety-related problems and behavioral or conduct problems. It is unclear whether these complications are due to inadequate healthcare caused by noncompliance or other environmental variables (Cuvo, 2011). However, these complications often lead to a higher mean number of physician visits for children with intellectual and developmental disabilities (IDD) as compared to typically developing children (Gurney et al., 2006). This might suggest that children with IDD are more likely to exhibit noncompliance in a healthcare setting, as they have had more opportunities to associate negative stimuli with healthcare procedures (Cuvo, 2011). However, the extent to which noncompliance with essential healthcare routines is problematic for typically developing children is also unclear.

Noncompliance during healthcare routines is problematic, especially for children with IDD, for a number of reasons. First, it may affect successful completion or quality of the

procedure, which may lead to significant health concerns (DeMattei, Cuvo & Maurizio, 2007; Kuhn & Allen, 1994). Second, noncompliance may limit access to necessary healthcare. Professionals may refuse or avoid providing service (Kemp, 2005), and parents may refuse, delay, or avoid needed services because previous experiences were aversive (Griffin & Schneiderman, 1992). Clevenger et al. (1993) found that 42% of surveyed parents of children with IDD reported child noncompliance and resistance as a barrier to receiving dental care. In the same survey, only 20% of surveyed dentists were willing to treat clients with IDD because of the resistance often experienced with this population. Third, medical students often receive limited training in dealing with patients with IDD (Fenton, Hood, Holder, May, & Mouradine, 2003). Waldmen and Perlman (2002) reported that in a national study of U.S. and Canadian dental schools conducted in the late 1990s, almost 75% of the schools provided 5% or less of clinic time to care of patients with IDD. Finally, noncompliance, avoidant movements, and problem behavior during healthcare procedures may expose the child to risk of injury during the procedure leading to the use of invasive strategies such as physical restraint (Altabet, 2002) and chemical sedation (Silver, Wilson, & Webb, 1994; Kemp, 2005) by medical professionals. Krause, Vianio, Zwetchkenbaum, and Inglehart (2010) reported that 70% of US and Canadian dental training programs reported teaching students to use protective restraints and nitrous oxide when working with patients with IDD.

Although behavior analysts have an established history of designing interventions for healthcare noncompliance, the application of functional analysis methodology to the assessment of the variables maintaining such behavior has been surprisingly infrequent. A notable except is a study by Iwata, Pace, Kalsher, Cowdery, and Cataldo in 1990. These authors conducted a functional analysis of problem behavior that included a “medical demand” condition, during

which a therapist's comments and questions about medical problems were accompanied by palpating the child's body parts but were terminated contingent upon problem behavior. Results showed that the child's problem behavior was maintained by social negative reinforcement in the form of escape from "medical demands." More often, it is assumed that noncompliance during essential healthcare routines is a form of avoidance or escape.

Numerous behavioral interventions for noncompliance with healthcare routines have been described. Antecedent-based strategies are common, although they are typically used in conjunction either with other antecedent strategies or with consequent-based strategies.

*Desensitization*, or *stimulus fading*, is a strategy in which the individual is gradually exposed to the aversive situation or stimulus (Altabet, 2002; Birkan, Krantz, & McClannahan, 2011; Bishop et al., 2013; Conyers, et al., 2004; Cuvo, Godard, Huckfeldt, & DeMattei, 2010; Cuvo, Reagan, Ackerlund, Huckfeldt, & Kelly, 2010; Ghuman, Cataldo, Beck, & Slifer, 2004; Luscre & Center, 1996; Newson & Simon, 1977; Shabani & Fisher, 2006; Simer & Cuvo, 2009).

*Modeling* is a strategy in which an antecedent stimulus is presented that is topographically identical to the desired imitative behavior (Conyers et al., 2004; Cuvo et al., 2010; Cuvo et al., 2010; Ghuman et al., 2004; Gillis, Natof, Lockshin, & Romanczyk, 2009; Luscre & Center, 1996; Melamed, Hawes, Heiby, & Glick, 1975; Stokes & Kennedy, 1980; Williams, Hurst, & Stokes, 1983). *Distraction (noncontingent reinforcement)* is a strategy in which the individual is provided with free access to something to listen to, something to watch, or something to do such that the stimuli compete for attention with the aversive healthcare stimuli or evoke behavior incompatible with noncompliance and avoidant behavior during the procedure (Allen & Stokes, 1989; Deleon et al., 2008; Filcheck et al., 2005; Kemp, 2005; Slifer et al., 1999; Stark et al., 1989; Venham et al., 1981). *Noncontingent escape* is a strategy in which brief breaks from the

procedure are provided on a fixed-time schedule (O'Callaghan, Allen, Powell, & Salama, 2006).

*High-probability-request sequencing*, in which demands likely to evoke compliance are delivered prior to demands associated with noncompliance, also have been used to facilitate healthcare compliance (McComas, Wacker, & Cooper, 1998; Riviere, Becquet, Peltret, Facon, & Darcheville, 2011). *Simulation training* is a strategy in which training is conducted in an environment, or with a stimulus, that is made to resemble the actual procedural setting or stimulus but is likely to be preferred or familiar to the individual (Durstun, et al., 2009; Slifer, Koontz, & Cataldo, 2002; Neef, Parrish, Hannigan, Page, & Iwata, 1989). Common consequent-based strategies have included *differential reinforcement of other behavior* (Cuvo et al., 2010; Shabani & Fisher, 2006), *differential positive reinforcement for compliance* (Allen, Loiben, Allen, & Stanley, 1992; Ghuman et al., 2004; Kohelberg, Greenberg, Reymore, & Hass, 1972; Luscre & Center, 1996; McComas et al., 1998; Simer & Cuvo, 2009), *differential negative reinforcement for compliance* (Allen et al., 1992; Allen & Stokes, 1987; Shumacher & Rapp, 2011), and *escape extinction* (Allen et al., 1992; Allen & Stokes 1987; Altabet, 2002; Cuvo et al., 2010; Cuvo et al., 2010; Filcheck, et al., 2005; Ghuman et al., 2004; Gillis, Natof, Lockshin, & Romanczyk, 2009; Ingersoll, Nash, & Gamber, 1984; Kohlenberg, Greenberg, Reymore, & Hass, 1972; Luscre & Center, 1996; McComas et al., 1998; Slifer, Avis, & Frutchey, 2008; Simer & Cuvo, 2009; Stark et al., 1989; Venham et al., 1981; Williams, Hurst, & Stokes, 1983).

Almost all of these studies have involved interventions consisting of numerous treatment components. Kohelnberg, Greenberg, Reymore, and Hass (1972) used reinforcement, shaping, fading, and prompting to increase compliance with typical instructions delivered during a dental procedure (e.g., sit in the chair, relax, look at me, open mouth). Subjects included 17 residents from an institution with severe IDD, ranging in age from eight to twenty years. Results

suggested that these behavioral strategies were successful in increasing the amount of time that subjects complied with demands as well as in decreasing the amount of restraint necessary to complete the dental procedure. Schumacher and Rapp (2011) used a changing-criterion research design to evaluate the effects of contingent edibles and escape for appropriate sitting during a haircut routine for a five-year-old boy with autism. Results indicated the intervention was successful in eliminating escape responses previously emitted by the subject and in increasing the duration of sitting sufficient to allow his hair to be cut in his home setting. This compliance behavior maintained over a two-month period. Cuvo, Godard, Huckfeldt, and DeMattei (2010) used a training package that consisted of stimulus fading, distraction, photo prompts, differential reinforcement, and escape extinction. The purpose of this study was to increase compliance with an 8-component oral assessment. The effects of the training package were assessed for five children with IDD between the ages of three to five years. Maintenance and generalization were also assessed. Results suggested that the training package was successful in increasing compliance with all 8 components of the oral assessment for all eight children. Maintenance of responding, and generalization across examiners and settings, were also demonstrated.

The use of treatment packages makes the independent effects of each strategy unclear. This is particularly problematic because the majority of treatment strategies incorporate escape extinction in some way, which is often dangerous for both the experimenter and the child, especially when sharp objects or tools are involved (e.g., dental pick, drill, clippers, scissors). For example, Allen and Stokes (1987) used reinforcement in the form of escape, tangibles, and praise to increase compliance with a dental routine for five children reported to engage in disruptive behaviors. Increasingly longer periods of cooperation were required to receive reinforcement. However, if at any time a child engaged in disruptive behaviors, all verbal and

nonverbal interactions were terminated, but the procedure continued. Thus, extinction was also in place. Results demonstrated that treatment was successful in reducing disruptive behavior as well as decreasing overall heart rate and blood pressure during the dental procedure. However, due to the use of extinction, no dental work was actually performed; the drill bit and needles were removed from the equipment, and protective plastic caps covered other dental equipment. This greatly limits the validity of the findings because it is unclear whether cooperation will continue when protective coverings were removed and dental work was actually conducted. Therefore, it seems important for future studies to determine the necessity of the extinction component in a treatment package. If extinction can be removed from a treatment package and similar results can be obtained, then treatment could incorporate actual equipment and routine work, thus increasing the validity of the findings.

Recently, researchers have begun to assess the efficacy and efficiency of these behavioral strategies when used without extinction. For example, Bishop et al. (2013) examined the use of stimulus fading, without extinction, to increase compliance with tooth brushing for three children with autism ranging in age from four to five years. Stimulus fading consisted of creating a 30-step stimulus-fading hierarchy that slowly increased the length of exposure to stimuli associated with tooth brushing and eventually to tooth brushing per se. Reinforcers were delivered contingent upon completion of the stimulus-fading step. Any avoidant behaviors resulted in escape and termination of that trial. Results demonstrated that stimulus fading was successful in increasing compliance with tooth brushing. These results generalized across different caregivers and different stimuli. Other treatment packages that do not include escape extinction have also been shown to successfully increase compliance with essential healthcare routines including video modeling (Conyers, et al., 2004; Melamed, Hawes, Heiby, Glick, 1975), desensitization

(Conyers, et al., 2004), noncontingent escape (O'Callaghan, Allen, Powell, & Salama, 2006), high-probability request sequencing (Riviere, Becquet, Peltret, Facon, & Darcheville, 2011), and stimulus-fading plus reinforcement and corrective feedback (Newsom & Simon, 1977). However, limited research has been conducted on increasing compliance with essential healthcare routines without the use of extinction as compared to the evaluation of treatment packages that do include extinction, suggesting more research in this area is warranted.

Several studies have involved either component analysis or treatment comparisons. For example, distraction has been shown to be insufficient in isolation by several studies (Allen & Stokes, 1989; Filcheck et al., 2005; Kemp, 2005; Venham et al., 1981). Conyers et al. (2004) assessed the effectiveness of in vivo desensitization and video modeling separately for increasing compliance with dental procedures. Subjects included six adults with severe to profound mental retardation. Sessions were conducted in a dental facility using dental equipment. However, the dental equipment never actually passed the plane of the child's mouth. In vivo desensitization consisted of gradually exposing the subject to steps associated with going to the dentist contingent upon relaxed and calm behavior exhibited by the subject. The session continued until the subject refused to complete a step, at which point escape was provided. Video modeling consisted of allowing the subject to view a 15-min video of a well-known staff member exhibiting appropriate behavior during a dental examination and receiving praise for doing so. Again, sessions continued until the subject refused to complete a step. Results showed that video modeling was effective for only one of the three subjects for whom it was evaluated. However, desensitization was effective for increasing compliance of the other five subjects. Generalization and maintenance of treatment effects to an actual dental procedure were not assessed. More

studies that evaluate the effects of particular behavioral strategies alone in increasing compliance with essential healthcare routines would be beneficial.

Many of the studies on healthcare compliance treatment have conducted training in the actual environment (O'Callaghan, Allen, Powell, & Salama, 2006; Conyers, et al., 2004; Melamed, Hawes, Heiby, & Glick, 1975; Riviere, Becquet, Peltret, Facon, & Darcheville, 2011). This generally requires extensive access to resources (e.g., medical and dental personnel, medical and dental equipment) and can be very time consuming, making the practical use of these strategies limited (Cuvo, 2011). Therefore, the extent to which these behavioral strategies are useful to those who do not have access to such resources is unclear.

However, there have been a number of studies that have evaluated treatment first in an analog setting. For example, Hagopian and Thompson (1999) evaluated the effects of shaping and escape for avoidance behavior on the levels of compliance with a respiratory treatment for one child with cystic fibrosis and an intellectual disability. Treatment was first conducted in an analog setting (a specific treatment room) and then across a variety of rooms. An increase in compliance was observed across all settings, suggesting it may be possible to treat noncompliance with essential healthcare routines in an analog setting and observe generalization of treatment effects in the actual setting. In a more recent example, Cuvo, Godard, Huckfeldt, and DeMattei (2010) evaluated the effects of a behavioral treatment package on compliance levels with an oral assessment for five children with autism. The treatment package consisted of exposure, video modeling, training of skills in which children demonstrated a deficit, stimulus fading, distraction, photo prompts, differential reinforcement, and escape extinction. The treatment was implemented in an analog setting and tests for generalization of treatment effects were conducted at a local dental clinic. Results indicated that the treatment package was



successful in increasing compliance with the oral assessment in the analog setting. Furthermore, these treatment effects generalized to the actual setting for five subjects. The authors suggested such a high level of generalization may have been due to programmed stimuli in the analog setting that directly matched stimuli found in the actual setting. Nonetheless, this suggests that it may be possible to teach compliance with essential healthcare routines to children with limited resources by conducting treatment in an analog setting.

Many studies, however, lack a distinct test for generalization and maintenance of treatment effects to the actual setting during an actual procedure, thus limiting our knowledge about the extent to which effects from training in an analog setting will generalize or maintain. For example, Shumacher and Rapp (2011) only tested treatment effects for compliance with haircutting in the home with the mother of the subject. No generalization tests to other settings were conducted. O'Callaghan, Allen, Powell, and Salama (2006), Conyers, et al. (2004), and Melamed, Hawes, Heiby, and Glick (1975) all conducted treatment in the actual dental setting, but did not test for generalization to other settings or for maintenance. Bishop et al. (2013) conducted treatment for brushing teeth in the home and were able to show generalization to various stimuli and caregivers. However, no tests for maintenance were conducted. Riviere, Becquet, Peltret, Facon, and Darcheville (2011) conducted treatment for a medical examination both in the home and in the actual setting. However, they did not test for generalization or maintenance when the treatment was removed. Finally, Newsom and Simon (1977) conducted training for a vision examination in an analog setting, but did not test for generalization or maintenance of treatment effects to the actual setting. These tests for maintenance and generalization are important because healthcare appointments are likely to be unpredictable and irregularly spaced over time (Cuvo, 2011). Therefore, future research should assess for

generalization and maintenance of treatment effects in the actual setting with the treatment removed.

Given the degree to which child noncompliance with healthcare routines has been reported to be problematic, as well as the findings and implications of previous treatment studies, we were interested in developing a treatment procedure that (a) could be conducted in a readily accessible analog environment (child's classroom), (b) would not require extensive involvement by health professionals, (c) would not require escape extinction in order to avoid or at least minimize the risk of increased problem behavior, and (d) would be procedurally similar but applicable to a range of healthcare routines. The current study evaluated the effectiveness of demand fading and differential reinforcement of compliance, specifically without the use of escape extinction, in increasing compliance with various essential healthcare routines. This was done in an analog setting with generalization and maintenance tests in the actual setting. Doing so allowed for the assessment of a procedure that could be used by those with limited access to resources and was applicable to a variety of essential healthcare routines. The purpose of Study 1 assessed the number of children who exhibit noncompliance with essential healthcare routines in a university-based early childhood education center. The purpose of Study 2 was to evaluate the effects of a treatment procedure in terms of acquisition, maintenance, and generalization.

### **Study 1: Prevalence of Noncompliance with Essential Healthcare Routines**

The purpose of Study 1 was to evaluate the number of children who exhibit noncompliance with essential healthcare routines in a university-based early childhood education center. The center consisted of four programs – two inclusive, early education programs, serving both typically developing children and children diagnosed with IDD, and two early intensive behavioral intervention (EIBI) programs, specifically designed for children diagnosed with IDD.

#### **Method**

**Subjects.** In an attempt to identify a sample of children who exhibited noncompliance during essential healthcare routines, parents of children who attended the early childhood education center as well as parents of children who attended an early intensive behavioral intervention (EIBI) classroom for children with IDD were contacted. A total of 48 families had at least one child enrolled at the center, with a total of 50 children enrolled (i.e. there were two sibling pairs). Surveys were distributed to all 48 families. Families with two or more children enrolled at the center completed a separate survey for each child. Children enrolled ranged in age from 1-year to 7-years-old. Some had a known diagnosis of IDD. Some had no known diagnosis. Forty four children were enrolled in the early childhood education center and four children were enrolled in the EIBI center.

Surveys were received from 21 of the 48 families concerning 22 children (i.e., there was one sibling pair). One family returned the survey but chose not to participate. This yielded a sample of 20 children. The mean age of the children was 2-years 11-months (range, 1-year 7-months to 4-years 8-months). Demographic characteristics of the sample (i.e., gender, age, classroom enrollment, and diagnosis – if any) are shown in Table 1. The sample consisted of 14 males and 6 females. The majority (75%) of individuals were reported to have no known

diagnosis. Of the five children who were reported to have a diagnosis, four were diagnosed with autism and one was diagnosed with Kawasaki Disease.

**Survey instrument and procedure.** A survey on problem behavior (i.e., noncompliance, crying, elopement, screaming, hitting, grabbing, pinching, scratching, stereotypy, property destruction, throwing materials, negative statements, and self-injury) exhibited during essential healthcare routines was developed for the purposes of the current study. Surveys were distributed to families in their child's cubby located in the child's classroom. Parents were asked to complete the survey for each child in their family that attended the center. A letter detailing the purpose of the survey and general instructions for survey completion accompanied the survey.

The survey was a 6-part questionnaire. Part 1 of the questionnaire was required if participating in the survey; all subsequent parts were optional. Part 1 requested basic information about the child (child's name, relation to child, gender, age, an indication of essential healthcare routines for which the child may benefit from assistance, diagnosis, and an indication of whether the child has exhibited problem behavior during any essential healthcare routine in the past year). If parents indicated that their child had exhibited problem behavior during at least one essential healthcare routine in the past year, then they were asked to fill out the relevant sections of Part 2 through Part 6. Part 2 through Part 6 requested specific information regarding the relevant essential healthcare routine (i.e., if problem behavior has occurred during the routine, if a professional has ever denied service due to problem behavior, if parents avoid taking their child to relevant appointments due to fear or embarrassment, how often problem behavior occurs during the relevant appointment, when problem behavior typically occurs during the relevant appointment, the topography of the problem behavior, and

the severity of the problem behavior). Part 2 specifically asked questions regarding the dental routine. Part 3 specifically asked questions regarding the optometrist routine. Part 4 specifically asked questions regarding the hair cut routine. Part 5 specifically asked questions regarding any other essential healthcare routine procedure during which the child exhibits problem behavior that occurs in the community. Finally, Part 6 specifically asked questions regarding any other essential healthcare routine procedure during which the child exhibits problem behavior that occurs in the home. A copy of the survey is provided in the appendix.

## **Results and Discussion**

Of the subjects for whom the occurrence of problem behavior was reported, the most common topography of problem behavior was noncompliance, occurring in 100% of the subjects. This was followed by crying, which occurred in 83% of subjects. Elopement and screaming were reported to occur in 67% of subjects. Hitting, kicking, grabbing, pinching, scratching, and stereotypy were reported to occur in 33% of subjects. Finally, property destruction, throwing materials, and negative statements were reported to occur in 17% of subjects. Self-injury was not reported to occur for any of the subjects. Severity of problem behavior was measured as either mild, moderate, or severe. All of the subjects (100%) were reported to have some mild and some moderate forms of problem behavior. Half of the subjects (50%) were reported to have some severe forms of problem behavior. Frequency of problem behavior was reported as *rarely ever (has occurred once)*, *some of the time*, or *every time the routine was attempted*. Of the subjects who reported problem behavior, 17% were reported to have problem behavior rarely ever (has occurred once), 33% of subjects were reported to have problem behavior some of the time, and 50% of the subjects were reported to have problem behavior every time. Problem behavior was most commonly reported to occur during both

dentist and haircut routines, occurring for 50% of the subjects. This was followed by pediatrician appointments, occurring for 33% of subjects. Optometrist, nail trimming, dinner, and daily preparation routines (i.e., brushing teeth, washing face, putting on socks and shoes) were reported for 17% of subjects. Table 2 shows the demographics of problem behavior for those subjects for whom it was reported to occur (topography, severity, frequency, and routine).

Overall, problem behavior was reported to occur with 6 of the 20 subjects surveyed, indicating a prevalence of problem behavior during essential healthcare routines of 30% of the population at this particular center. Five of the 6 children who exhibited problem behavior were male and one was female. Two of the children were between the age of 25 and 36 months. Four of the children were between the age of 37 and 48 months. Two of the children attended the early childhood education classroom and four of the children attended the early intensive behavioral intervention classroom. Finally, of the 20 children for whom surveys were returned, 15 had no known diagnosis and five had some known diagnosis. Of the 15 with no known diagnosis, only two exhibited problem behavior (13%). Of the five that had a known diagnosis, one was diagnosed with Kawasaki Disease. She did not exhibit problem behavior. The other four children were diagnosed with autism and all four exhibited problem behavior (100%). Table 3 shows overall results of problem behavior reported in Study 1.

These findings are particularly interesting for two reasons. First, these results indicate that problem behavior may occur during haircut procedures as often as during dental procedures. This is interesting because problem behavior during dental routines is more commonly reported in the literature as compared to problem behavior reported to occur during a haircut routine. This may be because problem behavior during a dental routine is of more social importance than problem behavior during a haircut routine. It is likely that the absence of a healthy dental routine

in a child's life may be more detrimental to the child's health than the absence of a healthy haircut routine. It is also likely that problem behavior during a dental procedure may be more dangerous for the child than problem behavior during a haircut procedure. Finally, problem behavior occurring during a dental routine may require more invasive strategies (e.g., sedation) than when problem behavior occurs during a haircut routine. All of these factors may contribute to the treatment of problem behavior during dental routines being of more social importance than haircut, even though problem behavior may be just as likely to occur during haircut routines.

The second reason these findings are particularly interesting is because the survey results indicate that all children with a diagnosis of autism exhibited some form of problem behavior with at least one essential routine. Furthermore, survey results indicated that only two children (or 13%) with no known diagnosis experienced problems with at least one essential routine. This suggests that noncompliance with essential healthcare routines is much more likely to occur for children with IDD. Although no study has directly compared the prevalence of problem behavior exhibited by the IDD population during healthcare routines to the prevalence of problem behavior exhibited by those with no known diagnosis during healthcare routines, many studies report the occurrence of problem behavior when working with those diagnosed with IDD (Altabet, 2002; Bishop, et al., 2013; Conyers, et al., 2004; Cuvo, Godard, Huckfeldt, & DeMattei, 2010; Cuvo, Reagan, Ackerlund, Huckfeldt, & Kely, 2010; Ghuman, Cataldo, Beck, & Slifer, 2004; Gillis, Natof, Lockshin, & Romanczyk, 2009; Kohelberg, Greenberg, Reymore, & Hass, 1972; Luscre & Center, 1996; McComas, Wacker, & Cooper, 1998; Newson & Simon, 1977; Riviere, Becquet, Peltret, Facon, & Darcheville, 2011; Shabani & Fisher, 2006; Shumacher & Rapp, 2011; Simer & Cuvo, 2009; Slifer, Avis, & Frutchey, 2008). Thus, the findings of the current survey seem to support the reported problem in the relevant literature.

The results of the current survey add to the literature by further suggesting that noncompliance with essential healthcare routines is likely to be encountered by early childhood education teachers who work with IDD populations. There are several reasons why this might be the case. First, children with IDD are likely to be subject to additional healthcare routines above and beyond those routines typically experienced by a child because additional healthcare routines are often required to obtain a diagnosis. This means there are numerous occasions for these children to experience aversive stimuli associated with healthcare routines. Furthermore, the common characteristics of children diagnosed with IDD may contribute to the likelihood of the occurrence of problem behavior. These characteristics include impairments in communication and social behavior, restrictive repetitive behavior, lack of receptive and expressive language skills, lack of joint attention, hyper- or hyposensitivity to certain stimuli, and avoidant behavior towards physical contact with strangers. Healthcare appointments often alter a child's typical daily routine, may require long wait periods with the presence of excess noise and strangers in an unfamiliar environment, may involve the presence of unusual and possibly aversive stimuli (e.g., smells, sounds), and may involve the presence of painful stimuli accompanied by physical contact and demands, all of which may increase the aversiveness of the situation (Cuvo, 2011). Thus, it seems important to establish a treatment procedure that may decrease the aversiveness of essential healthcare routines and, in turn, increase compliance.

Various behavioral techniques have been reported to increase compliance and decrease problem behavior during essential healthcare routines (e.g., stimulus shaping and fading with reinforcement, prompting, escape extinction, differential reinforcement of other behavior, differential reinforcement of alternative behavior, changing criterion, contingent and noncontingent escape, desensitization, video modeling, live modeling, reinforcement, contingent



distraction, and high probability request sequencing. However, as discussed previously, the evaluation of the majority of these techniques include the use of extinction in some way. Extinction is not always a possibility as it could lead to a dangerous environment, especially when the essential healthcare routine requires sharp objects (e.g., scissors and dental pick). Therefore, it seems appropriate to develop a treatment procedure that does not require the use of extinction. Also, many of these techniques were evaluated using extensive resources. These resources are not likely to be available to the majority of populations who serve children with IDD (e.g., paraprofessional in a mainstream school). Therefore, it seems appropriate to develop a treatment procedure that only requires resources typically available in a childhood education setting. Finally, generalization and maintenance of treatment effects have not been adequately assessed. Therefore, it seems appropriate to evaluate the generalization and maintenance of treatment effects across a variety of healthcare routines.

### **Study 2: Increasing Child Compliance with Essential Healthcare Routines**

The results of Study 1 suggested that noncompliance with essential healthcare routines (especially haircuts, dental exams, eye exams, and pediatric exams) was problematic for all of the children with developmental disabilities in this center. Noncompliance with essential hygiene routines (especially dinner and daily preparation routines) was problematic for two of the children with no known diagnosis in this center (13%). The purpose of Study 2 was to develop a treatment procedure that (a) could be conducted in a child's classroom, (b) did not require extensive involvement by healthcare professionals, (c) did not require escape extinction in order to minimize the risks associated with increased challenging behavior, and (d) was procedurally similar but applicable to a range of essential healthcare routines. Therefore, the effects of a treatment procedure that included demand fading and differential reinforcement without

extinction on levels of compliance with two of the essential healthcare routines reported to be problematic for the families who participated in Study 1 was evaluated.

## **Method**

**Subjects.** Subjects were seven children enrolled in the university-based early childhood education center, including the four children identified in Study 1 and three additional children identified through the parent survey following completion of Study 1. Thus, all of the children were reported by their parents to exhibit excessive avoidant movements, crying, disruptive behavior, or aggression during haircut appointment or dental examinations. The children ranged in age from 3 to 5 years and were all diagnosed with autism. Four children participated only in the haircut routine. Matt was a 2-year-old boy diagnosed with autism. Calvin was a 5-year-old boy diagnosed with autism. Philip was a 5-year-old boy diagnosed with autism. Peter was a 5-year-old boy diagnosed with autism. Philip and Peter were twin brothers. One child participated only in the dentist routine. Jake was a 3-year-old boy diagnosed with autism. Finally, two children participated in both the haircut and dentist routines. Brent was a 3-year-old boy diagnosed with autism. Brandon was a 3-year-old boy diagnosed with autism. Taken together, a total of six children participated in the haircut routine and a total of three children participated in the dental routine. The university institutional review board approved the study.

**Settings.** Study 2 involved two different settings. The effects of the treatment procedure on levels of child compliance with essential healthcare routines was evaluated in an analogue setting within the children's early education setting (i.e., an available classroom area). Additionally, generalization probes were conducted in the actual healthcare setting.

***Analogue environment.*** Baseline, treatment, and no-treatment probes were conducted in a single classroom that served as a multipurpose analogue setting. That is, this separate

classroom was made to resemble the essential healthcare routine setting relevant to each subject. For haircut routines, a portion of the room was set to resemble a hair salon and contained a salon chair, shampoo bottles, clippers, scissors, combs, a spray bottle, a cape, brushes, a sink, a blow dryer, a mirror, and miscellaneous hair posters. For dental routines, the same portion of the room was made to resemble an examination room and contained an exam chair (i.e., the same reclining salon chair used in the haircut sessions), a dentist's stool, a sink, an exam light, and dental instruments (e.g., a toothbrush, an electrical toothbrush, a suction appliance, gauze, a face mask, gloves, a dental pick, a mirror). Additionally, a small area adjacent to the analogue-setting area was used as "the waiting room" and contained a child-size table, two child-size chairs, and various play materials (e.g., books, toys). All of these sessions were brief (5-30 min) and incorporated into the child's school day during times that minimized disruption to regularly scheduled educational instruction. One to three sessions were conducted per day, three to five days per week.

***Actual healthcare environment.*** Generalization-probe sessions were conducted by actual healthcare professionals in the actual setting relevant to each subject (i.e., salon or dental office). The parents transported their child to and from the appointment and were present during the entire session. An experimenter was present to ensure safety, collect data, and videotape the sessions; however there were no programmed consequences by the experimenter. Generalization probes were conducted prior to, during, and following the treatment evaluation. Haircut generalization probes occurred approximately every 12 weeks. Dental generalization probes occurred less frequently, approximately every 24 weeks, because the frequency of dental examinations was dependent on the parents' insurance coverage benefits. Generalization probes never occurred on the same day as baseline, treatment, or no-treatment probe sessions.

**Task analysis.** Prior to the onset of Study 2, a task analysis (TA) of each essential healthcare routine was created by the experimenters and verified by professionals for each essential routine procedure. That is, a detailed identification and description of the specific behavioral steps and response sequence involved in getting a haircut and undergoing a dental examination was created. The experimenter initially created the haircut TA by watching an actual haircut appointment performed by a stylist. Subsequently, the TA was given to a stylist at a local salon who provided additional suggestions and revisions regard the TA steps. The final haircut TA consisted of 11 total steps including tolerance with the barber adjusting the chair; wearing the cape; and allowing hair to be cut with clippers (without a blade), sprayed with water, combed, and blow dried. Table 4 lists the component skills and sequence involved in the haircut procedure. The dental TA was also created by watching an actual dental examination performed by a local dental hygienist and dentist. Subsequently, the TA was given to the dentist who provided additional suggestions and revisions regarding the TA steps. The final dental TA consisted of 32 total steps including allowing the exam chair to be reclined (and raised) and sustaining an open mouth while examinations were conducted with various instruments such as an exam light, dental mirror, and dental pick. Table 5 lists the component skills and sequence involved in the dental procedures.

**Response measurement and reliability.** Trained observers recorded the occurrence of the child's compliance with each step of the TA for a given essential healthcare routine. All sessions were video recorded for the later purpose of presentation. Data were collected both in situ and from video. Data from sessions conducted in the actual setting were always scored from video in order to minimize intrusiveness in the professional setting. Data were collected in situ for the majority of all other sessions. However, it was sometimes necessary to score these

sessions from video in order to obtain interobserver reliability data. For every session, however, both observers independently or concurrently collected data in situ or both observers independently and concurrently collected data from the video.

Dependent variables included compliance, problem behavior, and negative vocalizations. Compliance in the context of a healthcare routine may include two distinct topographical forms (Cuvo, 2011). In some instances, the patient simply may need to tolerate a procedure being performed by the healthcare professional (i.e., no active responding is required of the patient). In other instances, the patient may need to emit an active response that allows the provider to perform a procedure (e.g., open mouth, look up or down, and close eyes). Therefore, *compliance* was defined as either (a) engaging in the behavior specified by a given TA step within 5 s of the prompt to do so and without problem behavior or (b) tolerating an adult performing the given TA step for the specified duration and without engaging in problem behavior. For example, compliance would be scored for the step, “get in the chair”, if the child got into the chair on his or her own within 5 s of the instruction in the absence of problem behavior. Likewise, compliance would be scored for the step, “cut hair with comb and scissors for four minutes,” if the child did not move away from the scissors or block the scissors in any way for four minutes without problem behavior. *Problem behavior* was defined as the occurrence of aggression (e.g., hitting, kicking, biting, scratching), property destruction (e.g., kicking the wall or materials, destroying materials, throwing materials), or self-injurious behavior (e.g., head banging, head hitting, or body hitting). *Negative vocalizations* were defined as the occurrence of crying, screaming, or refusal statements (e.g., “No,” “I don’t like it,” or “Stop it”). These problem behavior and negative vocalization responses were chosen based on problem behavior reported

to occur during Study 1. Data were analyzed as the number of TA steps associated with each dependent variable for each session.

Data collectors stood to the side of the room in which the procedure was conducted such that they could observe both the child and therapist behavior. Data collectors were instructed not to engage with the subject in any way. At least two data collectors were present at all times. One collected data while the other recorded the session. When interobserver reliability data were collected, a third observer was present. The primary data collector also verbally prompted the therapist to conduct each step of the task analysis by providing a 5 s warning before the next TA step should be administered.

Two independent observers simultaneously, but independently collected data on all dependent variables (compliance, problem behavior, and negative vocalizations) during at least 30% of sessions within each condition for each subject. Agreement was defined as both observers recording the occurrence (or nonoccurrence) of each dependent variable during each step of the task analysis. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100%. For generalization probes, the mean interobserver agreement score across subjects for compliance was 96.11% (range: 91%-100%), for problem behavior was 94.78% (range: 89%-100%), and for negative vocalizations was 93.67% (range: 91%-100%). For baseline sessions, the mean interobserver agreement score across subjects for compliance was 99.88% (range: 92%-100%), for problem behavior was 97% (range: 92%-100%), and for negative vocalizations was 97.67% (range: 92%-100%). For treatment sessions, the mean interobserver agreement score across subjects for compliance was 99.57% (range: 98%-100%), for problem behavior was 98.71% (range: 97%-100%), and for negative vocalizations was 97.71% (range: 95%-100%). For no-treatment

probes, the mean interobserver agreement score across subjects for compliance was 98.5% (range: 91%-100%), for problem behavior was 98.75% (range: 93%-100%), and for negative vocalizations was 96.63% (range: 93%-100%). For no-treatment probes with reinforcement (Jake only), the mean interobserver agreement score for compliance was 94%, for problem behavior was 100%, and for negative vocalizations was 98%. For treatment fading sessions (Jake only), the mean interobserver agreement score for compliance was 100%, for problem behavior was 100%, and for negative vocalizations was 98%. Finally, the mean interobserver agreement score across all conditions and all subjects was 97.5%, (range: 96%- 100%).

Agreement for duration of the TA step was defined as both observers recording the same duration in seconds for the same TA step. Agreement was calculated by summing the total seconds for all TA steps involved in a session for both observers separately and dividing the smaller number by the larger number. For baseline sessions, the mean interobserver agreement score across subjects for duration was 94% (range: 86%-99%). For treatment sessions, the mean interobserver agreement score across subjects for duration was 96.57% (range: 93%-100%). For no-treatment probes, the mean interobserver agreement score across subjects for duration was 97.38% (range: 94%-99%). For no-treatment probes with reinforcement (Jake only), the mean interobserver agreement score across subjects for duration was 94%. For treatment fading sessions (Jake only), the mean interobserver agreement score across subjects for duration was 97%.

**Procedural integrity.** Procedural integrity data were collected for at least 30% of sessions within each condition. Specifically, the primary observer recorded the therapist's adherence to the TA steps (including the duration of the step), the delivery of reinforcement, and the termination of the session. Adherence to the TA steps was defined as the therapist

conducting the steps in the pre-specified order within at least five seconds of the pre-specified duration. Accurate delivery of reinforcement was defined as the continuous delivery of reinforcement contingent upon the subject's compliance in the absence of problem behavior. Accurate termination of the session was defined as terminating session following completion of the target step or following noncompliance, problem behavior, and/or 10 s (consecutive) of negative vocalizations. The level of procedural integrity was calculated by dividing the number of accurate responses by the sum of the number of accurate and inaccurate responses and multiplying by 100%. For generalization probes, procedural integrity data were not collected because no programmed consequences occurred. For baseline sessions, the mean procedural integrity score across subjects for adherence to the TA step was 100% (range: 100% to 100%), for delivery of reinforcement was 100% (range: 100% to 100%), and for termination of the session was 99.56% (range: 97% to 100%). For treatment sessions, the mean procedural integrity score across subjects for adherence to the TA step was 99.29% (range: 97% to 100%), for delivery of reinforcement was 99.57% (range: 98% to 100%), and for termination of the session was 99.71% (range: 99% to 100%). For no-treatment probes, the mean procedural integrity score across subjects for adherence to the TA step was 99.88% (range: 99% to 100%), for delivery of reinforcement was 100% (range: 100% to 100%), and for termination of the session was 99.63% (range: 98% to 100%). For no-treatment probes with reinforcement (Jake only), the mean procedural integrity score for adherence to the TA step was 100%, for delivery of reinforcement was 100%, and for termination of the session was 100%. For treatment fading sessions (Jake only), the mean procedural integrity score for adherence to the TA step was 98%, for delivery of reinforcement was 73%, and for termination of the session was 99%. Finally, the



mean level of procedural integrity across all conditions and all subjects was 99.51%, (range: 99% to 100%).

**Free-operant preference assessment.** A free-operant preference assessment similar to that described by Roane, Vollmer, Ringdahl, and Marcus (1998) was conducted prior to the start of treatment sessions (described below) to identify highly preferred items that might function as reinforcers for compliance. Preference for five items was assessed during brief (2-min) sessions, in which the subject had free access to one of the five items. Trained data collectors recorded the presence or absence of item engagement during 5-s intervals using a data collection software program (ABC Data Pro) on an iPod. *Item engagement* was defined as either contact between the child's hands and the item or visual orientation towards the item (e.g., iPad). This preference assessment (PA) format was chosen due to its appropriateness for subjects who may lack prerequisite skills (e.g., scanning an array, picking from an array) necessary for other PA formats and because this PA format is a duration-based index of preference (i.e., identifies items associated with extended periods of interaction). The two highest-ranked items identified in this assessment were used as reinforcers during treatment sessions. These items were not present during any conditions other than treatment (baseline, no-treatment probes, or generalization probes).

**Experimental conditions.** A non-concurrent multiple-baseline-across-subjects design and a multiple probe design were used to evaluate the effects of treatment on levels of compliance, problem behavior, and negative vocalizations during the essential healthcare routines.

**Baseline.** During baseline, a familiar teacher told the child, "Time for our appointment with the hair stylist/dentist" and prompted the child to walk to the waiting room area. A therapist

(initially unfamiliar with the child and dressed in attire relevant to the healthcare routine) entered the waiting room area and prompted the child to accompany him or her to the salon or dental exam room. Subsequently, the therapist verbally prompted the child through each TA step. Compliance resulted in praise. Noncompliance, problem behavior, or negative vocalizations lasting for 10 s (consecutive) resulted in immediate session termination.

***Treatment.*** Treatment consisted of differential reinforcement of compliance (DRC) and demand fading. DRC consisted of continuous access to preferred items contingent upon compliance with the TA steps. Demand fading consisted of gradually exposing the child to a predetermined number of TA steps.

The initial number of TA steps targeted for the first treatment session was identified as one TA step beyond the TA step with which the subject complied with frequently during baseline sessions. An exception was made for one subject during the dental healthcare routine, Brandon, because he exhibited extremely varied levels of responding during baseline. For Brandon, the first TA step was set at one below the TA step with which he complied with, on average, during baseline.

Progression and regression criteria were established to identify each subject's target TA step following the initial target TA step identified after baseline. There were two ways in which a subject could progress through TA steps. First, the target TA step increased by one following two consecutive sessions in which the subject complied with a target TA step without the occurrence of problem behavior or negative vocalizations. Second, if during a no-treatment probe (described below) the subject complied with TA steps beyond the current TA step targeted in the treatment sessions and did not engage in problem behavior or negative vocalizations for 10 s (consecutive), the target TA step for subsequent treatment sessions would increase by one step

beyond the highest TA step during the no-treatment probe. There were also two ways in which a subject could regress to a previous TA step. First, following three consecutive sessions in which the sessions were terminated before the subject reached the target TA step, the target TA step would decrease by one step. Second, following eight consecutive sessions at a given target TA step without meeting progression criterion, the target TA step would decrease one step.

For some subjects, further task analysis of a target TA step was necessary. This was determined when the subject met the step-fading criterion. If the subject met regression criterion on 2 consecutive attempts of the same target step, then the step-fading criterion was met. This meant that target TA step was task analyzed into subcomponent steps. Subcomponent steps were created by experimenters and were either comprised of decreasing the distance of the stimuli associated with the step from the subject until the stimuli were touching the subject (e.g., clippers held six inches from the child's head, clippers held three inches from the child's head, clippers held one inch from the child's head, clippers touching head) or increasing the duration of the step until the full duration of the original step was completed (e.g., cut with comb and scissors for two minutes, cut with comb and scissors for three minutes, cut with comb and scissors for four minutes). In some cases, both distance and duration were used to create the subcomponent steps. The same progression and regression criteria were used for subjects to move through these subcomponent TA steps. An exception to this criterion was made for one subject, Calvin, because Calvin was progressing through TA steps at a much slower rate than other subjects. In an attempt to speed the progression through TA steps, step-fading was implemented for Calvin after meeting regression criterion on only one attempt for a target step.

During treatment sessions, a familiar teacher told the child, "Time for your appointment with the hair stylist or dentist" and prompted the child to walk to the waiting room area. A

therapist (the same therapist used in baseline sessions and still dressed in attire relevant to the healthcare routine) entered the waiting room area and prompted the child to accompany them to the salon or dental exam room. Subsequently, the therapist offered the items identified by the preference assessment to the child and verbally prompted the child through each TA step until the subject completed the TA step targeted for that session or engaged in noncompliance, problem behavior, or negative vocalizations for 10 s (consecutive), at which point the session was terminated and the preferred items were removed. That is, compliance resulted in praise and access to high preferred items but problem behavior, noncompliance, or negative vocalizations for 10 s (consecutive) resulted in removal of praise and preferred items and immediate session termination. For Calvin specifically, vocally saying or signing, “all done” also terminated session. This was because Calvin was being taught to vocally state or manually sign “all done” as an alternative response to self-injurious behavior.

***No-treatment probes.*** No treatment probes were identical to baseline, except that a novel therapist conducted the sessions. The frequency of conducting no-treatment probes was based on the speed at which the subject progressed through steps. No-treatment probes were conducted more frequently when subjects progressed quickly through steps and less frequently when subjects progressed slowly through steps. However, a no-treatment probe was conducted at least every 15 sessions, regardless of the subject’s progress. An exception to this was made during step-fading. During step-fading, only one no-treatment probe was conducted. No-treatment probes and treatment sessions were not conducted on the same day. The purpose of no-treatment probes was to assess the degree to which performance acquired during treatment sessions maintained, as well as assess potential response generalization (i.e., occurrence of untrained TA-step behaviors).

**Generalization probes.** Generalization probes were conducted in the actual setting by the relevant professionals. Experimenters were present to ensure safety and collect data. However, no programmed consequences were implemented. That is, the professional would implement consequences as he or she deemed necessary. Although no professional ever chose to terminate a session, the option was available. Furthermore, professionals sometimes chose to offer the child distractor items (e.g., water dripping on the mirror, music). These were all delivered noncontingently. Generalization probes were conducted prior to, during, and following the baseline and treatment phases. The purpose of generalization probes was to assess the extent to which treatment effects generalized to the non-training setting.

## **Results and Discussion**

Results for Study 2 are depicted in Figure 1 through Figure 3. Graphing conventions remain the same for all subjects. Sessions are scaled to the x-axis and TA steps are scaled to the y-axis. Bars represent performance during generalization probes. The height of the bar indicates the number of TA steps attempted by the professional. Gray shading indicates the number of those steps with which the subject had the opportunity to comply. Therefore, the remaining white shading of the bar indicates the number of TA steps during which the subject was restrained. Squares denote the number of steps with which the subject complied. Circles denote the number of steps during which negative vocalizations occurred. Triangles denote the number of steps during which problem behavior occurred. Blue data points depict behavior occurring during generalization probes. Gray data points depict behavior occurring during baseline and treatment sessions. Red data points depict behavior occurring during no-treatment probes. A horizontal bar above data points indicates that a TA step was further task analyzed and broken into subcomponents during these sessions.

Data for Philip in the haircut routine are presented in the first graph in Figure 1. In Philip's first generalization probe, he only complied with one of seven available steps. Levels of negative vocalizations were high and levels of problem behavior were low. In baseline, Philip quickly learned to comply with 100% of TA steps associated with getting a haircut. Therefore, treatment was not evaluated. During Philip's second generalization probe, he complied with all eight available steps and negative vocalizations decreased. This pattern of baseline mastery was observed with another subject, Brent. Data for Brent in the haircut routine are presented in the second graph for Figure 1. Although substantial improvement was observed during his second generalization probe, in that no restraint was used, Brent did not successfully comply with all available steps during his second generalization probe and engaged in moderate to high levels of problem behavior and negative vocalizations, suggesting treatment would be appropriate.

Data for Peter in the haircut routine are depicted in the first graph in Figure 2. During Peter's first generalization probe, he complied with one of the six available steps. He was restrained for five of these steps. He also had problem behavior during one step and negative vocalizations during five steps. During baseline, Peter consistently complied with two steps of the TA. Therefore, treatment was evaluated. His initial target TA step was step three. For Peter, additional fading of certain TA steps with which he had difficulty was necessary. Additionally, it was necessary to change the verbal statement made by the therapist when he or she entered the waiting room to "come here," a demand Peter had been taught outside of this study. It was also necessary to apply the cape behind Peter and turn it around to ensure compliance with wearing the cape. Finally, to increase compliance, it was necessary to change the final step from blowing hair with a blow dryer to drying Peter's neck with a towel. Through continued treatment, Peter learned to comply with all 11 TA steps associated with getting a haircut. No-treatment probes

conducted throughout treatment demonstrated increased compliance over time, eventually ending with several no-treatment probes in which Peter complied with all 11 steps of the TA. A second generalization probe was conducted during treatment. In this generalization probe, slight improved performance was observed. Although Peter did not comply with any of the six available steps, he was only restrained for four of the steps (as opposed to five). Also, negative vocalizations occurred during only four of the steps (as opposed to five) and no problem behavior occurred. During Peter's final generalization probe, following successful completion of treatment, again a slight improvement was observed. Although Peter still did not comply with any of the four available steps, Peter was not restrained for any of the steps. No problem behavior occurred, but negative vocalizations occurred during all four steps. This suggests that compliance failed to generalize to the actual environment.

Data for Matt in the haircut routine are presented in the second graph in Figure 2. In his first generalization probe, Matt did not comply with any of the five available steps. Furthermore, Matt was restrained for one step. Negative vocalizations also occurred during all five steps. No problem behavior occurred. In baseline, Matt consistently complied with three of the TA steps associated with getting a haircut. Therefore, treatment was evaluated. For Matt, additional fading of certain TA steps with which he had difficulty was also necessary. Initially, Matt was not complying with the target step for an extended period of time and fading was unsuccessful. Therefore, edibles were added to the leisure reinforcers delivered. Furthermore, Matt was observed to have trouble staying seated in a chair in which his feet did not touch the ground. Therefore, a foot rest was added. Matt was also observed to have trouble wearing the cape for an extended period of time. Therefore, first, Matt's arms were pulled out from under the cape to ensure he could manipulate his reinforcers. Although this initially increased compliance with

wearing the cape, this increased compliance did not maintain. Therefore, the cape was placed next to Matt so that other steps could be taught more quickly. New preference assessments were also conducted twice throughout treatment contingent upon a decrease in compliance for steps with which Matt previously complied. This was to increase the likelihood of a potent reinforcer. Finally, Matt was observed to lean forward when the buzzers touched his head, even following the addition of subcomponent steps. Therefore, a verbal prompt “sit up” was added. To date, Matt has learned to comply with nine of the eleven TA steps. Furthermore, the footrest has been removed. Levels of problem behavior and negative vocalizations have remained low during treatment sessions. During no-treatment probes, compliance has varied anywhere from two to six steps. Problem behavior and negative vocalizations have remained low. Throughout treatment, Matt has participated in six generalization probes. Overall, compliance has increased from zero steps to five steps, with the exception of the most recent generalization probe, and levels of problem behavior and negative vocalizations have decreased, with the exception of the most recent generalization probe. During the most recent generalization probe, Matt only complied with two of the eight available steps. Furthermore, he had to be restrained for five of these steps. Negative vocalizations occurred during three of the steps. Problem behavior occurred during one of the steps. Because Matt is still not consistently complying with all steps, further treatment is needed. Interestingly, as compliance has increased, the number of steps conducted by the hair stylist has also increased and the number of steps in which Matt was restrained has decreased. Likewise, when compliance decreased in the most recent generalization probe, the number of steps conducted by the hair stylist also decreased and the number of steps in which Matt was restrained increased.



Data for Brandon in the haircut routine are presented in the third graph in Figure 2. During Brandon's first generalization probe he complied with six of the eight available steps. He was restrained for one step. Negative vocalizations occurred during six steps. There were no occurrences of problem behavior. During baseline, responding differed from other subjects in that extremely variable levels of compliance were observed. No improvements in performance were observed during Brandon's second generalization probe. Therefore, treatment was evaluated. During treatment, Brandon consistently complied with all 11 steps associated with getting a haircut. However, inconsistent performance was observed during the no-treatment probes. A low level of compliance was observed initially, but a high level of compliance was observed during the subsequent probe. Unfortunately, compliance did not improve during Brandon's third generalization probe. However, as compared to the previous two generalization probes, both the number of steps in which Brandon was restrained and the number of steps during which negative vocalizations occurred decreased.

Data for Calvin in the haircut routine are presented in the fourth graph in Figure 2. In his first generalization probe, Calvin did not comply with any of the three steps available. Furthermore, he was restrained for all three steps. Problem behavior occurred during two of these steps and negative vocalizations occurred during three of these steps. During baseline, Calvin consistently complied with two steps of the TA, suggesting treatment was necessary. Calvin's initial target TA step was step three. For Calvin, additional fading of steps with which he had difficulty was also necessary. Furthermore, it was also necessary to introduce edible items as fading of TA steps was not successful. Finally, two exceptions occurred with Calvin. First, Calvin was allowed to terminate session by signing or saying, "All done." Sessions in which this response terminated sessions are indicated by an asterisk below the x-axis. Second,

the fading criterion changed in an attempt to allow Calvin to progress through steps more quickly. To date, Calvin has learned to comply with three of the eleven TA steps associated with getting a haircut. During no-treatment probes, Calvin consistently complies with two TA steps. Problem behavior does not occur and negative vocalizations are low. Calvin has participated in a total of three generalization probes. Improved performance has not been observed for any of the generalization probes. Calvin continues to be restrained for all available steps and compliance does not occur. Furthermore, problem behavior and negative vocalizations are high.

Data for Jake in the dental routine are presented in the first graph in Figure 3. In his first generalization probe, he complied with 13 of the 24 available steps. He was restrained for five of these steps. Problem behavior occurred during five of these steps and negative vocalizations occurred during one step. In baseline, Jake complied with 16 of the TA steps during two of the three sessions. Therefore, treatment was considered necessary and Jake's initial target TA step was step 17. Jake learned to comply with all of the 32 TA steps associated with going to the dentist and maintained low levels of problem behavior and negative vocalizations throughout treatment. During no-treatment probes, Jake progressively complied with more steps of the TA as treatment progressed. Although responding was variable, problem behavior and negative vocalizations remained low during all no-treatment probes. Because compliance was variable during no-treatment probes, an evaluation was conducted to see if compliance would be more consistent if a novel therapist conducted the sessions (as is the case for no-treatment probes) but reinforcement was present. These sessions are indicated by the open black data points.

Unfortunately, compliance remained variable. Following treatment, Jake was scheduled for a second generalization probe. However, due to a miscommunication, we were unable to observe his dental appointment. Therefore, given the variable responding observed during no-treatment

probes, the six months leading to his next dental appointment were used to test compliance during consecutive no-treatment probes that were conducted one week apart. High levels of compliance were observed for four sessions, but the level decreased slightly on the fifth session. This suggested that compliance may not generalize to the actual environment either. To further increase the likelihood of successful generalization, the schedule of reinforcement was thinned from continuous to one in which reinforcement would be delivered after completion of the entire dental routine (such that Jake's parents could simply deliver the reinforcer at the end of his dental exam). Daily treatment sessions with a continuous schedule of reinforcement were conducted until stable levels of compliance were observed. A new preference assessment was also conducted at this point to increase the likelihood of potent reinforcers. Then, the schedule of reinforcement was gradually thinned to a fixed ratio 32. Sustained levels of 100% compliance were observed during reinforcement thinning. During Jake's second generalization probe, 100% compliance with available steps was observed. Further, no restraint was necessary and problem behavior and negative vocalizations did not occur. Thus, treatment effects successfully generalized to the actual environment. To assess maintenance, no-treatment probes were conducted once a month following this second generalization probe. During the first no-treatment probe, 100% compliance was observed with low levels of problem behavior and negative vocalizations. However, during the second no-treatment probe, compliance decreased and negative vocalizations increased. Problem behavior still did not occur. This suggests that treatment effects did not maintain. Therefore, a fixed ratio 32 schedule was conducted during treatment sessions until Jake's final generalization probe. During Jake's final generalization probe, he complied with 15 of the 21 available steps. He was not restrained for any of the steps.

Problem behavior did not occur, but negative vocalizations occurred during one step. This suggests that treatment effects did not maintain in the actual environment.

Data for Brent in the dental procedure are presented in the second graph in Figure 3. During Brent's first generalization probe, he complied with two of the 16 available steps. Furthermore he was restrained for nine of the available steps. Problem behavior occurred during three of the steps and negative vocalizations occurred during nine of the available steps. During baseline, compliance was variable. Therefore, treatment was necessary and his initial target TA step was step 14. During treatment, Brent consistently complied with more steps associated with going to the dentist. To date, he has learned to comply with 17 of the available steps. During no-treatment probes, compliance has increased slightly throughout treatment. Problem behavior and negative vocalizations have remained low during treatment. A second generalization probe was not conducted for Brent.

Data for Brandon in the dental procedure are presented in the third graph in Figure 3. During Brandon's first generalization probe, he complied with three of the eight available steps. He was restrained for four of the steps. Problem behavior occurred during two of the steps and negative vocalizations occurred during five of the steps. During baseline, Brandon initially consistently complied with five of the TA steps. It was observed that he consistently did not comply with the exam light (i.e., he covered his eyes). Therefore, a light cover was added. After the light cover was added, compliance was variable. Therefore, treatment was necessary and his initial target TA step was step 11. During treatment, Brandon consistently learned to comply with more steps of the TA. A new preference assessment was conducted to increase the likelihood of a potent reinforcer. To date, he has learned to comply with 17 of the available steps. During no-treatment probes, Brandon consistently complies with five of the available

steps. During his second generalization probe, a slight improvement in performance was observed. Brandon complied with 11 of the 12 available steps and was only restrained for one step. Negative vocalization occurred during six of the available steps, but problem behavior did not occur during any of the steps.

### **General Discussion**

The results of Study 1 are depicted in Table 3. Survey results indicated that all children diagnosed with autism experienced problems with at least one essential routine. Furthermore, survey results indicated that only two children with no known diagnosis experienced problems with at least one essential routine. This adds to the literature in further suggesting that noncompliance with essential healthcare routines is likely to be encountered by early childhood education teachers who work with IDD populations. Thus, a treatment procedure that can be easily incorporated into a child's school day and is relatively inexpensive, such as the procedure developed in this current study, is warranted.

The results of Study 2 are depicted in Figures 1 through 3. For two subjects, Philip and Brent, results suggested that the treatment procedure was not necessary because high levels of compliance were observed during baseline. Both Philip and Brent showed improvements during generalization probes following exposure to baseline. However, Brent still did not comply with all available steps during his final generalization probe, suggesting further treatment may be necessary.

The treatment procedure was effective for four of the subjects with whom it was evaluated— Brandon in haircut, Matt in haircut, Peter in haircut, and Jake in dentist. Furthermore, it seems promising for the remaining three children with whom it is currently in progress – Calvin in haircut, Brandon in dentist, and Brent in dentist. However, successful

generalization to the actual healthcare setting was only observed for one of the four children for whom treatment was effective – Jake in dentist. Limited generalization (decreases in the use of restraint and small increases in compliance) was observed for three of these children – Matt in haircut, Peter in haircut, and Brandon in dentist and haircut. Maintenance of treatment effects was evaluated for the one subject for whom generalization of treatment effects was observed—Jake in dentist. Maintenance of treatment effects did not occur.

Based on the results of Study 2, demand fading plus differential reinforcement may be effective for increasing compliance while maintaining low levels of problem behavior and negative vocalizations, at least in the analog setting. This procedure seems promising because (a) it is suitable for use in the educational setting, (b) no healthcare professionals are required during treatment sessions, (c) escape extinction was not a necessary component, and (d) it was relatively straightforward while applicable to a variety of different essential healthcare routines. However, it is interesting to note that for two subjects, Philip and Brent, this procedure was not necessary. This may suggest that mere exposure to an aversive environment is enough to increase compliance. In fact, previous research has demonstrated that graduated exposure may result in a reduction in anxiety and expected pain (Bernstein & Kleinknecht, 1982). Often, desensitization is conceptualized as this gradual exposure of an individual to the feared object or situation (Conyers et al, 2004). Desensitization has also been shown to increase compliance with essential healthcare routines, even when used alone. Therefore, it is possible that Philip and Brent's increase in compliance due simply to exposure demonstrates a desensitization effect.

For the remaining four subjects and for Brent in the dental routine specifically, however, mere exposure was not enough to increase compliance with an essential healthcare routine. Thus, treatment was necessary. Although treatment was effective for all four subjects and for

Brent in the dental routine, this treatment procedure is limited in the amount of time it took to treat the subjects for whom treatment was necessary. Subjects participating in the haircut routine have been participating for an average of 9 ½-months. For Peter, it required 9 months of training to increase compliance in the analog setting to 100% and this did not generalize to the actual setting, suggesting further treatment is still necessary. For Matt, it has required 20 months to increase compliance to 9 of the 11 TA steps. Again, this has not fully generalized to the actual setting and two more steps are required in the analog setting. For Brandon, treatment was comparatively quick, only requiring one month to increase compliance to 100% in the analog setting. However, this has not generalized to the actual environment, suggesting further treatment is still necessary. Finally, for Kalvin, it has required 8 months of treatment to increase compliance to three of the eleven TA steps, again with no generalization, suggesting further treatment is necessary. For subjects participating in the dental routine, they have participated for an average of 11 months. For Jake, 19 months were required to increase compliance to 100% in the analog setting and to get generalization of treatment effects in the actual setting. However, maintenance of these effects was not demonstrated. Finally, for both Brent and Brandon, it has required 7-months to increase compliance to 17 steps of the task analysis. Generalization to the actual setting has not occurred for Brent and there has been little generalization to the actual setting for Brandon. The lengthy duration of treatment necessary for many subjects is likely due to the removal of escape extinction. Previous research suggests that it is possible to alter the establishing operation of a behavior by adding reinforcement to the environment if the reinforcer is of higher quality than the previous reinforcer (Lalli, et al., 1999). Specifically, in the case of the current study, adding differential reinforcement may be altering the establishing operation for escape by creating a less-aversive environment. Essentially, a higher-quality reinforcer (i.e., toys

and edibles) is being offered for compliance than for noncompliance and problem behavior (i.e., escape). However, depending on the child's history, the aversiveness of the essential healthcare routine setting is likely to vary. Thus, it may be that for those who take longer to learn to comply with steps of the TA, escape is still a more potent reinforcer than toys and edibles. This is further supported by the fact that further demand fading, in the form of further task analyzing certain steps into subcomponents for certain children, helps to increase compliance. Research also suggests that demand fading (or desensitization) can decrease the aversiveness of a situation (e.g., Conyers, et al., 2004; Kemp, 2005). Thus, it is not surprising that demand fading plus differential reinforcement without escape extinction is successful in increasing compliance but is a very slow process. Future researchers may benefit from assessing procedures that lead to quicker increases in compliance with essential healthcare routines. It would be beneficial to know if the use of escape extinction is necessary to achieve more efficient results.

Unfortunately, a lack of generalization was also observed for most of the children. However, for a procedure that requires a complex amount of skills with a variety of different stimuli, in a very different setting, it may be worth discussing generalization in terms of a continuum that spans across time, behavior, people and stimuli, and setting (Drabman, Hammer & Rosenbaum, 1979). For example, it is worth noting that although generalization of complete performance was relatively poor, dramatic reductions in the level of negative vocalizations and the amount of physical restraint required during the generalization probes was observed for all subjects. Considering generalization as a continuum, there are a few hypotheses suggesting why complete generalization and maintenance to the actual environment did not occur for subjects in this study. First, reinforcement was delivered continuously during treatment in the analog setting, and no reinforcement was delivered during the generalization probe in the actual



environment. Thus, reinforcement may have been faded too quickly. Stokes and Baer (1997) suggested programming for indiscriminable contingences to avoid this problem. Interestingly, Jake's results indicate that this might be helpful in that after reinforcement had been faded to resemble that delivered in the actual setting, complete generalization was observed. This is limited by the fact that no generalization probe was conducted following treatment and prior to fading out reinforcement. The second hypothesis is that it is possible that the analog setting differed too extensively from the actual setting. Thus, there may have been too few overlapping stimuli between the two settings to facilitate generalization. Stokes and Baer (1997) suggested sequential modification of the treatment setting to avoid this problem. Cuvo, Godard, Huckfeldt, and DeMattei (2010) also suggested that much of the success in generalization of treatment effects for their subjects was likely due to programming for indiscriminable contingencies. Therefore, future researchers may benefit from evaluating the effects of gradually programming stimuli from the actual setting to the analog setting, or vice versa. Finally, healthcare visits can be extremely variable in setting, stimuli, and duration, especially for children with IDD who have, on average, more healthcare visits than a typically developing child (Cuvo, 2011). In the current study, varied lengths of time between generalization probes was observed, ranging from four weeks to three months. Procedural steps that varied from the TA in this study with durations different than those in the TA were also observed to be presented to the children by the healthcare professionals. Furthermore, it was observed that professionals presented novel stimuli (e.g., a neck cover, different razor, x-rays), especially when increases in compliance were observed. Future researchers may benefit from studies focusing on the evaluation of how to better facilitate response generalization across such varied healthcare visits.

Overall, the results of Study 2 seem promising in that a treatment was successfully implemented that increased compliance with essential healthcare routines. Furthermore, this study added to the current literature in demonstrating that sometimes mere exposure is enough to increase compliance with essential healthcare routines. When exposure is not enough, however, the use of demand fading and differential reinforcement is successful in increasing compliance with both dental and haircut routines. Also, this treatment did not require extensive resources and was able to be conducted for short periods within a child's regular school day. It also added to the current literature in demonstrating that treatment can be successful without the use of escape extinction, although it might be slow. Finally, this study added to the literature in demonstrating the importance of testing for generalization and maintenance of treatment effects to the actual setting with treatment removed, because it may not occur. Future researchers might explore how to better program for generalization and maintenance of treatment effects.

Although the results of the current study seem promising, limitations exist such as the limited degree of experimental control demonstrated by the multiple-probe design. For some subjects, no improvement was observed over time during no-treatment probes. This would experimentally demonstrate that demand fading and differential reinforcement was a necessary treatment, except that for some subjects improvements *were* observed during no-treatment probes. Therefore, although no-treatment probes allowed for the identification of generalization and maintenance for some subjects, generalization patterns limit the degree of experimental control offered by a multiple-probe design. Furthermore, the multiple baseline design allowed for experimental demonstration of the effects of treatment, but the delayed effects of treatment limit the degree of experimental control. This may be a fault of the procedures in that demand fading and differential reinforcement show slow effects over time. There are at least two ways

researchers could mitigate this in the future. First, future researchers may consider conducting several generalization probes prior to the onset of baseline sessions, as well as during the baseline phase, to examine the effects of mere exposure to the essential routine procedure on performance in the actual setting. Second, future researchers may consider conducting extended baseline phases with multiple subjects that extend past the point at which treatment effects begin to appear for other subjects. Both of these strategies would help demonstrate the necessity of the treatment component and eliminate mere exposure to the routines as a variable increasing compliance.

Results of the current study suggest that increasing compliance with essential healthcare routines without the use of extinction is possible. However, strategies need to be identified to improve both training efficiency and maintenance and generalization of compliance in the actual setting. Future researchers may consider modifying the methods of the current treatment procedure to facilitate better generalization in the actual environment. Overall, these strategies may help to better promote stronger generalization.

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## Tables

Table 1. Demographic characteristics of subject sample

Characteristics		Number of subjects	Percent of sample
Gender	Male	14	70%
	Female	6	30%
Age	12-24 months	5	25%
	25-36 months	6	30%
	37-48 months	7	35%
	49-60 months	2	10%
Classroom Setting	Inclusive Education	16	80%
	Early Intensive Behavioral Intervention (EIBI)	4	20%
Diagnosis	None	15	75%
	Autism	4	20%
	Kawasaki Disease	1	5%

Table 2. Demographics of problem behavior

		Number of subjects	Percent of sample
Topography	Noncompliance	6	100%
	Crying	5	83%
	Elopement	4	67%
	Screaming	4	67%
	Hitting	2	33%
	Kicking	2	33%
	Grabbing/Pinching	2	33%
	Scratching	2	33%
	Stereotypy	2	33%
	Property Destruction	1	17%
	Throwing Materials	1	17%
	Negative Statements	1	17%
	Self-Injury	0	0%
	Other	0	0%
Severity	Mild	6	100%
	Moderate	6	100%
	Severe	3	50%
Frequency	Rarely Ever (has occurred once)	1	17%
	Some of the Time	2	33%
	Every Time	3	50%
Routine	Dentist	3	50%
	Haircut	3	50%
	Pediatrician	2	33%
	Optometrist	1	17%
	Nails Cut	1	17%
	Dinner	1	17%
	Daily preparation routines	1	17%

Table 3. Results of center-based prevalence assessment

		Number of subjects exhibiting PB	Percent of sample
Total	Subjects	6	30%
Gender	Male	5	36%
	Female	1	17%
Age	12mo-24mo	0	0%
	25mo-36mo	2	33%
	37mo-48mo	4	67%
	49mo-60mo	0	0%
Classroom Setting	Inclusive Education	2	13%
	Early Intensive Behavioral Intervention (EIBI)	4	100%
Diagnosis	None	2	13%
	Autism	4	100%
	Kawasaki Disease	0	0%



Table 4. Task Analysis of Haircut Routine

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1. Teacher opens the salon/infant room door and says, “You’re going to see the stylist to get your hair cut,” and child walks into the salon/infant room
  2. Teacher says, “Sit in the chair or on the floor. You can play with these toys” and child sits in waiting area with the teacher for 1 consecutive min
  3. Child enters office/styling area and sits in chair for 30 consecutive sec
  4. Child allows barber/mock barber to apply cape around upper body.
  5. Child allows barber/mock barber to pump the chair for 5 consecutive sec
  6. Child sits in chair wearing cape for 1 consecutive min.
  7. Child allows barber/mock barber to cut hair with clippers (no blade in clippers during compliance training) for 30 consecutive seconds
  8. Child allows barber/mock barber to spray hair with water for 5 consecutive sec (5 sprays)
  9. Child allows barber/mock barber to comb hair with comb/brush for 15 consecutive sec
  10. Child allows barber/mock barber to cut hair with comb & scissors (no actual hair will be cut during compliance training) for 4 consecutive minutes
  11. Child allows barber/mock barber to wipe nape of neck with towel or blow dryer for 5 consecutive seconds
-

Table 5. Task Analysis of Dental Routine

- 
1. Teacher says, "You're going to see the dentist for a check-up," and child enters waiting room accompanied by teacher.
  2. Teacher says, "Sit in the chair or on the floor. You can play with these toys" and child sits in waiting area with the teacher for 1 consecutive min.
  3. Dentist/mock dentist approaches child and introduces himself/herself as "the dentist who will be checking your teeth." Dentist/mock dentist asks child to follow him/her to the dental office. Child enters office/styling area and sits in chair for 30 consecutive sec.
  4. Child tolerates chair being reclined to 180 degrees.
  5. Child tolerates chair being raised in the air for 5s.
  6. Child tolerates light for 30s (does not turn head).

*Examination*

7. Child chooses flavor of toothpaste.
8. Child opens mouth and tolerates top teeth being brushed with brush and toothpaste for 30s.
9. Child opens mouth and tolerates water being squirted in his or her mouth twice.
10. Child tolerates mirror to be moved around in mouth for 30s.
11. Child opens mouth and tolerates bottom teeth being brushed with brush and toothpaste for 30s.
12. Child opens mouth and tolerates water being squirted in his or her mouth twice.
13. Child opens mouth and allows (tolerates) mirror to be placed in mouth for 30s.
14. Child tolerates metal pick to touch teeth for 30s.
15. Child tolerates both metal pick to touch teeth while mirror is placed in mouth for 1 min.
16. Child tolerates water being squirted in his or her mouth twice.

*Cleaning: Polishing and Fluoride Treatment*

17. Child tolerates electric toothbrush touching teeth for 1 min.
18. Child opens mouth and allows (tolerates) suction device to be placed in mouth for 30s.
19. Child allows teeth and lips to be wiped with gauze for 10s.
20. Child tolerates the chair lowering for 5s.
21. Child tolerates the chair sitting up to 90 degrees.
22. Child waits for dentist for 1 min.

*Dentist Enters:*

23. Dentist/mock dentist approaches child and introduces himself/herself as "the dentist who will be checking your teeth." Child tolerates chair being reclined to 180 degrees.
  24. Child tolerates chair being raised in the air for 5s.
  25. Child tolerates light for 30s (does not turn head).
  26. Child tolerates towel being placed on chest and to be hooked around neck
  27. Child tolerates both metal pick to touch teeth while mirror is placed in mouth for 1 min.
  28. Child opens mouth and tolerates water being squirted in his or her mouth.
  29. Child smiles with teeth showing and tolerates dentist grabbing and moving lips/cheeks with the gauze for 10s.
  30. Child tolerates brush with fluoride on it to be rubbed on teeth for 1 min.
  31. Child tolerates the lowering of the chair for 5s.
  32. Child tolerates chair returning to 90 degrees.
-

## Figures

Figure 1. Mastery of routine during baseline

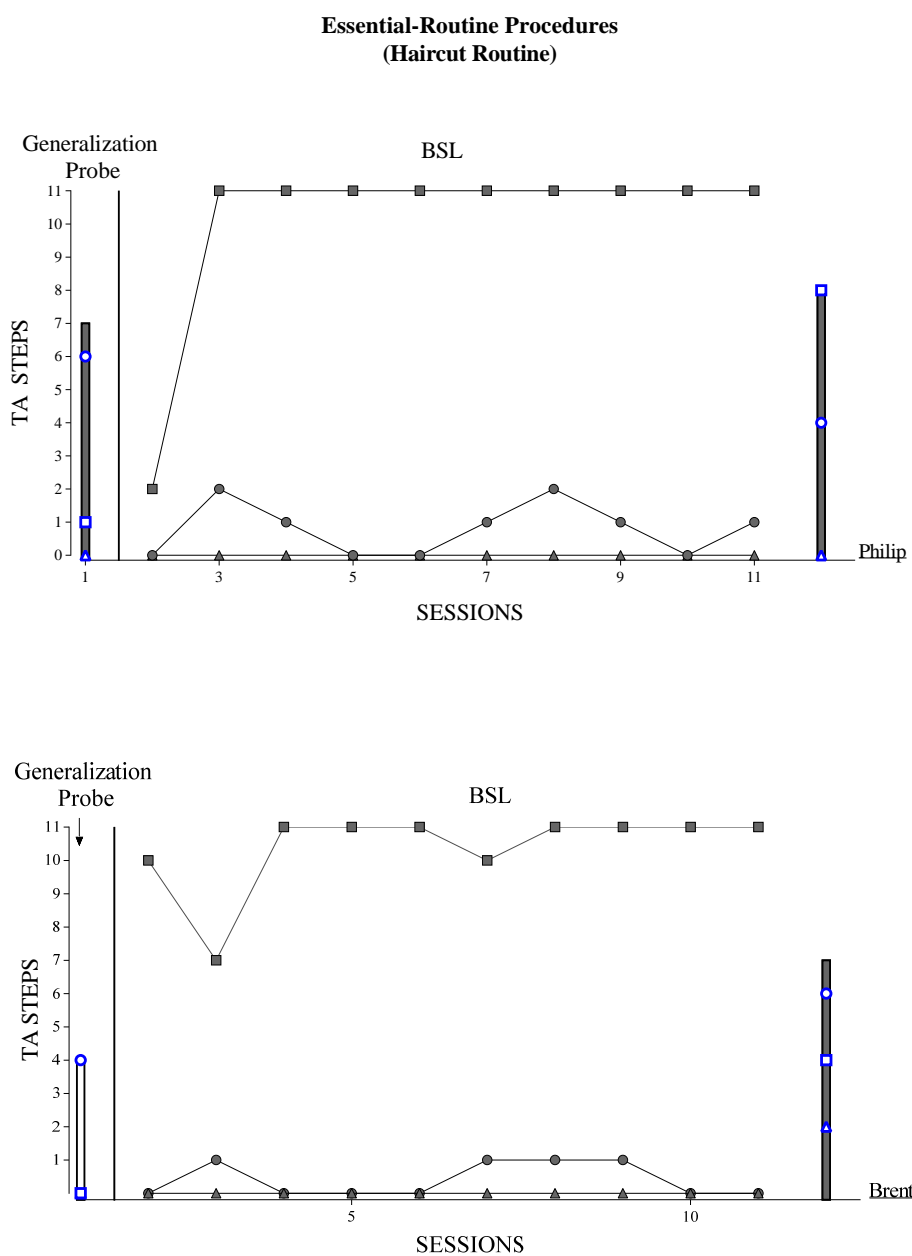


Figure 1. These data depict behavior during the haircut routine for subjects for whom it was not necessary to implement treatment.

Figure 2. Treatment evaluated for the haircut routine

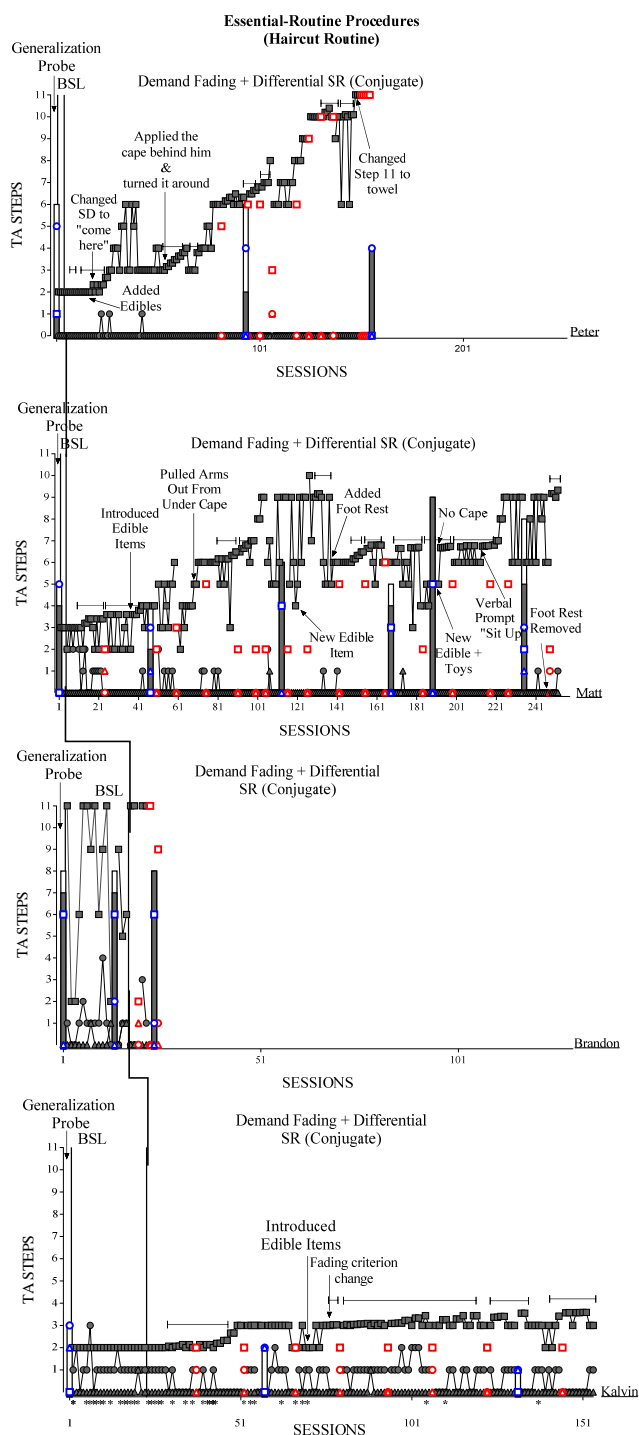


Figure 2. These data depict behavior during the haircut routine for subjects for whom it was necessary to implement treatment.

Figure 3. Treatment evaluated for the dental routine

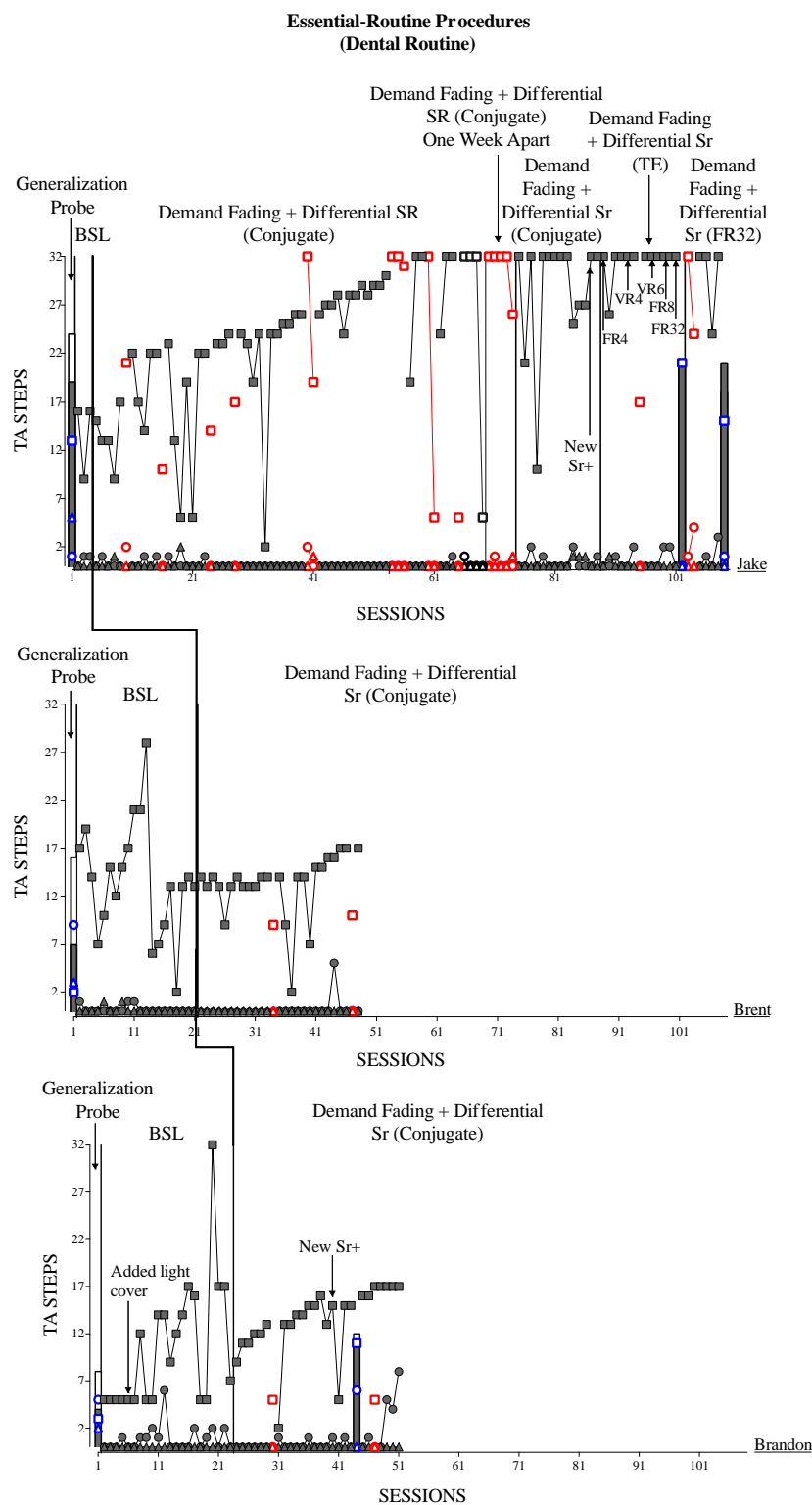


Figure 3. These data depict behavior during the dental routine for subjects for whom it was necessary to implement treatment.

## **Appendix: Parent Survey**

Edna A. Hill Child Development Center & The Applied Behavioral Science Department

Survey Regarding Child Compliance with Essential Healthcare Routines

### **INFORMED CONSENT**

*The Department of Applied Behavioral Science at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study.*

#### **Purpose**

Noncompliance with essential healthcare routines (e.g., haircuts, medical exams, etc.) can be a serious problem because it may prevent or limit the quality of the procedure. This survey is designed to identify types of essential healthcare routines that are particularly problematic for young children.

#### **Procedures**

A survey will be sent home to the parents of young children enrolled in several local early childhood education programs. The survey requests demographic information about your child's age, sex, history, and medical diagnosis (if any). In addition, the survey requests information about challenging behavior displayed during essential healthcare routines (e.g., type, frequency, severity, etc.).

#### **Alternatives to Participation**

You can choose not to participate in this study.

#### **Risks/Benefits**

There are no anticipated risks associated with participation in this study. Outcomes from the survey could result in identification of the prevalence of children's noncompliance with essential healthcare routines. In addition, outcome information will help inform procedures to a follow-up (but separate) study investigating strategies to effectively and efficiently teach young children to comply with essential healthcare routines. However, not all children will qualify for this follow-up study.

#### **Payment to subjects**

No payment will be made to you.

#### **Confidentiality**

All information related to this study will be kept confidential (electronic information kept on secure server and all paper documents kept in locked files in a locked room). Numbers or aliases will be used when presenting results to others (your name will not be associated with the research findings in any way). Permission granted on this date to use and disclose your information remains in effect indefinitely. By agreeing to participate, you give permission to use and disclose your information for purposes of this study at any time in the future.

#### **Consent refusal and withdrawal of consent**

Completion of this survey is voluntary. You may withdraw your consent for participation at any time, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas. You also have the right to cancel your permission to use and disclose information collected about you and/or your child, in writing, at any time, by sending your written request to: ***Pamela L. Neidert, Applied Behavioral Science Dept. , Dole 4023, University of Kansas, Lawrence, KS 66045.*** If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

### **Questions**

If you have any questions you should contact Pamela Neidert at (785) 864-0771. If you have questions about your rights as a research participant, call (785) 864-7429 or write the Human Subjects Committee, University of Kansas, Youngberg Hall, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563.

### **Consent**

I have been given information about what will be done and what I have to do. I am informed about the potential risks and benefits of participation. I am aware that I may quit or refuse at any time. If I have additional questions, I know to contact the investigator and/or the Human Subjects Committee.

☐ **I agree to participate in this study.** I will complete the attached survey and submit it to the investigator at the address indicated on the first page of the survey.

☐ **I do not agree to participate.**

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Print Participant's Name

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Signature

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Date

*"With my signature I acknowledge that I am over the age of eighteen, and I have received a copy of this consent form to keep. "*

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Investigator's Signature

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Date

### Survey Regarding Compliance with Essential Healthcare Routines

This is part of a research project at the University of Kansas to evaluate the prevalence of children who engage in challenging (problem) behavior during essential healthcare routines. Completion of the survey is voluntary. The survey requests information about your child's age, history, medical diagnosis (if any), and challenging behavior experienced during various types of essential healthcare routines (hair cuts, medical exams, etc). Completion of the survey documents your willingness to participate. Completion of the survey does not result in your child receiving direct services. For more information, contact Kelley Harrison, B.A. (k512h601@ku.edu) or Pamela Neidert, Ph.D. ([pneidert@ku.edu](mailto:pneidert@ku.edu)). To learn about your rights as a research participant, contact the Human Subjects Committee of Lawrence (HSCL) at 785-864-7385.

Please complete the survey and return to: Kelley Harrison/Pamela Neidert

4023 Dole Human Development Ctr.

1000 Sunnyside Avenue

University of Kansas

Lawrence, KS 66045

The purpose of this survey is to identify the prevalence of children (locally) who have difficulty tolerating essential healthcare routines (e.g., hair cuts, doctor examinations, dental procedures, hygiene routines, etc. ) either with professionals in the community or caregivers at home. The survey is also intended to identify the specific type and intensity of the difficulties these children experience.

#### **Instructions:**

The survey is divided into 6 sections and is designed to obtain information regarding your child's behavior during essential healthcare routines. Please complete all relevant sections. **Note:** **ALL parents/caregivers should complete Section 1.**

#### **Section 1: CHILD HISTORY**

Child's name: \_\_\_\_\_

Person completing form: \_\_\_\_\_ Relation to child:

\_\_\_\_\_

Date form completed: \_\_\_\_\_

Sex: M F

Date of Birth: \_\_\_\_\_



Circle all essential routines for which your child might benefit from assistance:

**Dental visit**

**Eye doctor visit**

**Hair cut visit**

**OTHER:**

\_\_\_\_\_

*(please specify)*

Last visit:

Last visit:

Last visit:

Last visit:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Medical diagnoses (if any): (Autism, PWS, mental retardation, etc):

\_\_\_\_\_

In the past year (12 mo), has your son/daughter exhibited problem behavior during essential routines (e.g., hair cut, optometrist visit, dental visit)?

YES

NO

**\*\*\*\*\*If yes, please complete the remainder of the survey. If no, please return page one.\*\*\*\*\***

## Section 2: DENTAL VISITS

1) Does your child engage in problem behavior at the **dentist**? YES NO  
N/A

2) Has a dentist ever denied/refused dental care due to problem behavior? YES NO

3) Do you avoid taking your child to the dentist due to fear of embarrassment or negative comments by others (dental staff, other parents)?  
YES NO

4) How often does problem occur during dental visits?  
☐ Rarely Ever (has occurred once)  
☐ Some of the Time (multiple instances have been observed)  
☐ Every Time (problem behavior occurs on every visit)

5) When does problem behavior typically occur when at the dentist? (Check all that apply)

<input type="checkbox"/> Prior to leaving your home	<input type="checkbox"/> During the dentist exam/cleaning
<input type="checkbox"/> Leaving your home	<input type="checkbox"/> During fluoride treatment
<input type="checkbox"/> During transportation to dentist office	<input type="checkbox"/> During x-ray exam
<input type="checkbox"/> In the waiting room & walking to dentist chair	<input type="checkbox"/> When cavities are filled
<input type="checkbox"/> When the hygienist/assistant enters the room	<input type="checkbox"/> Leaving the dentist's office
<input type="checkbox"/> During initial hygienist exam	<input type="checkbox"/> Walking back to your vehicle
<input type="checkbox"/> Waiting for dentist	<input type="checkbox"/> During transportation to home
<input type="checkbox"/> When the dentist enters the room	<input type="checkbox"/> After arriving home
<input type="checkbox"/> After child sees certain items associated w/ routine (e.g., scrapper). Specify below:	

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- 6) If the problem behavior occurs during situations/times not listed above, please describe the specific situations/times in which the problem behavior occurs:

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- 7) Description and severity of problem behavior: Check all that apply and indicate severity:

Problem behavior:	Severity:	Comments:
<input type="checkbox"/> Hitting	Mild Moderate Severe	
<input type="checkbox"/> Kicking	Mild Moderate Severe	
<input type="checkbox"/> Biting	Mild Moderate Severe	
<input type="checkbox"/> Grabbing/Pinching	Mild Moderate Severe	
<input type="checkbox"/> Scratching	Mild Moderate Severe	
<input type="checkbox"/> Property Destruction	Mild Moderate Severe	
<input type="checkbox"/> Throwing materials	Mild Moderate Severe	
<input type="checkbox"/> Self-injury	Mild Moderate Severe	
<input type="checkbox"/> Crying	Mild Moderate Severe	
<input type="checkbox"/> Negative statements	Mild Moderate Severe	
<input type="checkbox"/> Noncompliance/refusal	Mild Moderate Severe	
<input type="checkbox"/> Screaming	Mild Moderate Severe	
<input type="checkbox"/> Stereotypy/repetitive movements	Mild Moderate Severe	
<input type="checkbox"/> Elopement/attempts to leave	Mild Moderate Severe	
<input type="checkbox"/> Other:	Mild Moderate Severe	

Please provide any other information you think is important for your child's success with **dental** visits:

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### Section 3: EYE DOCTOR VISITS

1) Does your child engage in problem behavior at the eye doctor? YES NO  
N/A

2) Has an eye doctor ever denied/refused eye care due to problem behavior? YES NO

3) Do you avoid taking your child to the eye doctor due to fear of embarrassment or negative comments by others (eye care staff, other parents)?  
YES NO

4) How often does problem behavior occur during eye doctor visits?  
☐ Rarely Ever (has occurred once)  
☐ Some of the Time (multiple instances have been observed)  
☐ Every Time (problem behavior occurs on every visit)

5) When does problem behavior typically occur when at the eye doctor? (Check all that apply)

<input type="checkbox"/> Prior to leaving your home	<input type="checkbox"/> When the eye doctor enters the room
<input type="checkbox"/> Leaving your home	<input type="checkbox"/> During the eye exam
<input type="checkbox"/> During transportation to eye doctor office	<input type="checkbox"/> During fitting for glasses
<input type="checkbox"/> In the waiting room & walking to exam chair	<input type="checkbox"/> Leaving the eye doctor office
<input type="checkbox"/> When the assistant enters the room	<input type="checkbox"/> Walking back to your vehicle
<input type="checkbox"/> During assistant exam	<input type="checkbox"/> During transportation to home
<input type="checkbox"/> Waiting for eye doctor	<input type="checkbox"/> After arriving home
	<input type="checkbox"/> After child sees certain items associated w/ routine (e.g., glasses). Specify below:

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- 6) If the problem behavior occurs during situations/times not listed above, please describe the specific situations/times in which the problem behavior occurs:

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- 7) Description and severity of problem behavior: Check all that apply and indicate severity:

Problem behavior:	Severity:	Comments:
<input type="checkbox"/> Hitting	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Kicking	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Biting	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Grabbing/Pinching	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Scratching	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Property Destruction	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Throwing materials	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Self-injury	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Crying	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Negative statements	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Noncompliance/refusal	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Screaming	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Stereotypy/repetitive movements	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Elopement/attempts to leave	Mild Moderate Severe	<hr/>
<input type="checkbox"/> Other:	Mild Moderate Severe	<hr/>

Please provide any other information you think is important for your child's success with **eye doctor** visits:

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#### Section 4: HAIR CUT APPOINTMENTS

- 1) Does your child engage in problem behavior at the salon/barber? YES NO  
N/A
- 2) Has a hair stylist ever denied/refused salon/barber due to problem behavior? YES  
NO
- 3) Do you avoid taking your child to the salon/barber due to fear of embarrassment or negative comments by others (salon/barber staff, other parents)?  
YES NO
- 4) How often does problem occur during hair cut appointments?  
☐ Rarely Ever (has occurred once)  
☐ Some of the Time (multiple instances have been observed)  
☐ Every Time (problem behavior occurs on every visit)
- 5) When does problem behavior typically occur when at the hair salon/barber? (Check all that apply)
- |  |  |
|--|--|
| <input type="checkbox"/> Prior to leaving your home                            | <input type="checkbox"/> When hair is dried  |
| <input type="checkbox"/> Leaving your home                                     | <input type="checkbox"/> When nape of neck is wiped  |
| <input type="checkbox"/> During transportation to salon/barber                 | <input type="checkbox"/> When hair is styled   |
| <input type="checkbox"/> In the waiting room & going to sit in stylist's chair | <input type="checkbox"/> Leaving the salon/barber  |
| <input type="checkbox"/> When hair is washed                                   | <input type="checkbox"/> Walking back to your vehicle  |
| <input type="checkbox"/> When hair is combed/brushed                           | <input type="checkbox"/> During transportation to home   |
| <input type="checkbox"/> When hair is cut w/ clippers                          | <input type="checkbox"/> After arriving home   |
| <input type="checkbox"/> When hair is cut w/ scissors                          | <input type="checkbox"/> After child sees certain items associated w/ routine (e.g., scissors). Specify below: |

- 
- 
- 6) If the problem behavior occurs during situations/times not listed above, please describe the specific situations/times in which the problem behavior occurs:

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7) Description and severity of problem behavior: Check all that apply and indicate severity:

Problem behavior:	Severity:	Comments:
<input type="checkbox"/> Hitting	Mild Moderate Severe	
<input type="checkbox"/> Kicking	Mild Moderate Severe	
<input type="checkbox"/> Biting	Mild Moderate Severe	
<input type="checkbox"/> Grabbing/Pinching	Mild Moderate Severe	
<input type="checkbox"/> Scratching	Mild Moderate Severe	
<input type="checkbox"/> Property Destruction	Mild Moderate Severe	
<input type="checkbox"/> Throwing materials	Mild Moderate Severe	
<input type="checkbox"/> Self-injury	Mild Moderate Severe	
<input type="checkbox"/> Crying	Mild Moderate Severe	
<input type="checkbox"/> Negative statements	Mild Moderate Severe	
<input type="checkbox"/> Noncompliance/refusal	Mild Moderate Severe	
<input type="checkbox"/> Screaming	Mild Moderate Severe	
<input type="checkbox"/> Stereotypy	Mild Moderate Severe	
<input type="checkbox"/> Elopement/attempts to leave	Mild Moderate Severe	
<input type="checkbox"/> Other:	Mild Moderate Severe	

Please provide any other information you think is important for your child's success with **salon/barber** visits:

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**Section 5: OTHER ESSENTIAL PROCEDURE (COMMUNITY):**


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*(please specify)*

1) Does your child engage in problem behavior at the \_\_\_\_\_? YES NO

2) Has the \_\_\_\_\_ professional ever denied/refused/terminated the routine due to problem behavior?  
YES NO

3) Do you avoid taking your child to the \_\_\_\_\_ professional due to fear of embarrassment or negative comments by others (professional staff, other parents)?  
YES NO

4) How often does problem occur during \_\_\_\_\_?  
☐ Rarely Ever (has occurred once)  
☐ Some of the Time (multiple instances have been observed)  
☐ Every Time (problem behavior occurs on every visit)

5) When does problem behavior typically occur? (Check all that apply)

<input type="checkbox"/> Prior to leaving your home	<input type="checkbox"/> Leaving the appointment
<input type="checkbox"/> Leaving your home	<input type="checkbox"/> Walking back to your vehicle
<input type="checkbox"/> During transportation to the appointment	<input type="checkbox"/> During transportation to home
<input type="checkbox"/> In the waiting room	<input type="checkbox"/> After arriving home
<input type="checkbox"/> Throughout the entire routine certain items	<input type="checkbox"/> After child sees associated w/ routine (e.g., scissors). Specify below:

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6) If the problem behavior occurs during situations/times not listed above, please describe the specific situations/times in which the problem behavior occurs:



7) Description and severity of problem behavior: Check all that apply and indicate severity:

Problem behavior:	Severity:	Comments:
<input type="checkbox"/> Hitting	Mild Moderate Severe	
<input type="checkbox"/> Kicking	Mild Moderate Severe	
<input type="checkbox"/> Biting	Mild Moderate Severe	
<input type="checkbox"/> Grabbing/Pinching	Mild Moderate Severe	
<input type="checkbox"/> Scratching	Mild Moderate Severe	
<input type="checkbox"/> Property Destruction	Mild Moderate Severe	
<input type="checkbox"/> Throwing materials	Mild Moderate Severe	
<input type="checkbox"/> Self-injury	Mild Moderate Severe	
<input type="checkbox"/> Crying	Mild Moderate Severe	
<input type="checkbox"/> Negative statements	Mild Moderate Severe	
<input type="checkbox"/> Noncompliance/refusal	Mild Moderate Severe	
<input type="checkbox"/> Screaming/repetitive movements	Mild Moderate Severe	
<input type="checkbox"/> Stereotypy	Mild Moderate Severe	
<input type="checkbox"/> Elopement/attempts to leave	Mild Moderate Severe	
<input type="checkbox"/> Other:	Mild Moderate Severe	

Please provide any other information you think is important for your child's success with these visits:

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**Section 6: OTHER ESSENTIAL PROCEDURE (HOME):***(please specify)*

(e.g., medication administered at home, prompted bathing/showing - requires another person to bath/shower the target child)

- 1) Does your child engage in problem behavior during particular home-based activities in which he/she *must* engage?

YES    NO

- 2) Have you ever refused/terminated/allowed the child a break from the routine due to problem behavior?

YES    NO

- 3) How often does problem occur during \_\_\_\_\_?

\_\_\_ Rarely Ever (has occurred once)

\_\_\_ Some of the Time (multiple instances have been observed)

\_\_\_ Every Time (problem behavior occurs every time)

- 4) When does problem behavior typically occur? (Check all that apply)

\_\_\_ Immediately following instruction to start      \_\_\_ Leaving the room where routine o  
routine

\_\_\_ Throughout the entire routine      \_\_\_ After routine is completed

\_\_\_ After child sees certain items associated w/  
routine (e.g., medicine bottle). Specify  
below:

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- 5) Please list all other situations/aspects in which problem behavior occurs during these visits:

*For example: My daughter tries to hit us every time we try to give her a shower. The hitting gets especially problematic when we try to wash her hair; she is fine when we wash her body. The hitting starts as soon as we pick up the shampoo bottle and stops after her hair is completely soap free.*

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6) Description and severity of problem behavior: Check all that apply and indicate severity:  
 Problem behavior: Severity: Comments:

<input type="checkbox"/> Hitting	Mild Moderate Severe	
<input type="checkbox"/> Kicking	Mild Moderate Severe	
<input type="checkbox"/> Biting	Mild Moderate Severe	
<input type="checkbox"/> Grabbing/Pinching	Mild Moderate Severe	
<input type="checkbox"/> Scratching	Mild Moderate Severe	
<input type="checkbox"/> Property Destruction	Mild Moderate Severe	
<input type="checkbox"/> Throwing materials	Mild Moderate Severe	
<input type="checkbox"/> Self-injury	Mild Moderate Severe	
<input type="checkbox"/> Crying	Mild Moderate Severe	
<input type="checkbox"/> Negative statements	Mild Moderate Severe	
<input type="checkbox"/> Noncompliance/refusal	Mild Moderate Severe	
<input type="checkbox"/> Screaming	Mild Moderate Severe	
<input type="checkbox"/> Stereotypy/repetitive movements	Mild Moderate Severe	
<input type="checkbox"/> Elopement/attempts to leave	Mild Moderate Severe	
<input type="checkbox"/> Other:	Mild Moderate Severe	

Please provide any other information you think is important for your child's success with these visits:

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